



# Northeastern University



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## Graduate Catalog

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**Alan West-Durán**

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Professor, Psychology; University of California, Berkeley, PhD

**Paul C. Whitford**

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**John Peter Whitney**

Associate Professor, Mechanical and Industrial Engineering; Harvard University, PhD

**Lori Whynot**

Teaching Professor, American Sign Language; Macquarie University, Sydney (Australia), PhD

**Daniel Wichs**

Associate Professor, Computer Sciences; New York University, PhD

**Peter H. Wiederspahn**

Associate Professor, Architecture; Harvard University, MArch

**John Wilhbay**

Associate Professor, Journalism; Columbia University, MS

**Michael Wilczek**

Assistant Teaching Professor, Chemistry and Chemical Biology; University of Maine, PhD

**Lucy A. Williams**

Professor, Law; University of Chicago, JD

**Mark C. Williams**

Professor, Physics; University of Minnesota, Duluth, PhD

**Patricia J. Williams**

University Distinguished Professor, Law and Philosophy and Religion; Harvard University, JD

**Thomas M. Williams**

Assistant Clinical Professor, Medical Sciences; Northeastern University, MS

**Rebecca Willits**

Professor, Chemical Engineering; Cornell University, PhD

**Christo Wilson**

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**Sheila Winborne**

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**Raimond Winslow**

Professor, Bioengineering and Computer Sciences; Johns Hopkins University, PhD

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**Pamela Wojnar**

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**Max Wolf**

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**John Wolfe**

Associate Teaching Professor, College of Professional Studies; Columbia University, EdD

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Professor, Physics; University of California, Berkeley, PhD

**Stephen Wood**

Visiting Associate Clinical Professor, Nursing; Massachusetts General Hospital Institute of Health Professions, MS

**Dori C. Woods**

Associate Professor, Biology; University of Notre Dame, PhD

**Sarah Woodside**

Associate Teaching Professor, Management and Organizational Development; Boston College, PhD

**Adam Woolley**

Associate Clinical Professor, Pharmacy and Health Systems Sciences; Massachusetts College of Pharmacy, PharmD

**Benjamin Woolston**

Assistant Professor, Chemical Engineering; Massachusetts Institute of Technology, PhD

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**Dana E. Wright**

Professor, Mills College; Harvard University, EdD

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**Kinde M. Wubneh**

Assistant Professor, Entrepreneurship and Innovation and Pharmacy and Health System Sciences; University of Texas, Austin, PhD

**Sara A. Wylie**

Associate Professor, Sociology and Anthropology and Health Sciences; Massachusetts Institute of Technology, PhD

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Assistant Professor, Electrical and Computer Engineering; University of Massachusetts, Amherst, PhD

**Y****Milen Yakimov**

Professor, Mathematics; University of California, Berkeley, PhD

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Associate Professor, Physics; University of California, Santa Barbara, PhD

**Shiawee X. Yang**

Associate Professor, Finance; Pennsylvania State University, PhD

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Assistant Teaching Professor, Computer Sciences; Carnegie Mellon University, PhD

**Hideaki Yano**

Assistant Professor, Pharmaceutical Sciences; Columbia University, PhD

**Mathew Yarossi**

Assistant Professor, Physical Therapy, Movement, and Rehabilitation Sciences and Electrical and Computer Engineering; Rutgers University, PhD

**Mohammad Abbas Yaseen**

Assistant Professor, Bioengineering; Rice University, PhD

**Yasin Yazicioglu**

Assistant Professor, Mechanical and Industrial Engineering; Georgia Institute of Technology, PhD

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Associate Professor, Nursing; University of Pennsylvania, PhD

**Adetoun Yeaman**

Assistant Teaching Professor, College of Engineering; Virginia Polytechnic Institute and State University, PhD

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Professor, Electrical and Computer Engineering; Massachusetts Institute of Technology, PhD

**Roi Yehoshua**

Assistant Teaching Professor, Electrical and Computer Engineering; Bar-Ilan University (Israel), PhD

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Assistant Teaching Professor, World Languages Center; Purdue University, PhD

**Benjamin Yelle**

Associate Teaching Professor, Philosophy and Religion; University of Miami, PhD

**Sheng-Che Yen**

Associate Clinical Professor, Physical Therapy, Movement, and Rehabilitation Sciences; New York University, PhD

**Ayce Yesilaltay**

Assistant Teaching Professor, Biology; University of Massachusetts Medical School, PhD

**Caglar Yildirim**

Assistant Teaching Professor, Computer Sciences; Iowa State University, PhD

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**Jared Young**

Assistant Professor, Mills College; University of California, San Diego, PhD

**Lydia Young**

Associate Teaching Professor, College of Professional Studies; Boston College, PhD

**Stephanie Young**

Adjunct Professor, Mills College; Mills College, MFA

**Sarah C. Young-Hong**

Assistant Clinical Professor, Communication Sciences and Disorders; University of Pittsburgh, MA

**Jones Yu**

Teaching Professor, College of Engineering; Massachusetts Institute of Technology, PhD

**Shuishan Yu**

Associate Professor, Architecture; University of Washington, PhD

**Xubo Yue**

Assistant Professor, Mechanical and Industrial Engineering; University of Michigan, Ann Arbor, PhD

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**Naeem Zafar**

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**Michelle Zaff**

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**Christos Zahopoulos**

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**Moira Zellner**

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**Ke Zhang**

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**Ning Zhang**

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**Shuo Zhang**

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**Xufeng Zhang**

Assistant Professor, Electrical and Computer Engineering; Yale University, PhD

**Yang Zhang**

Professor, Civil and Environmental Engineering; University of Iowa, PhD

**Yue May Zhang**

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**Qianqian Zhang-Wu**

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**Pu Zhao**

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**Qing Zhao**

Assistant Professor, Chemical Engineering; Massachusetts Institute of Technology, PhD

**Yizhen Zhao**

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**Kuncheng Zheng**

Associate Professor, Finance; University of Michigan, Ann Arbor, PhD

**Yi Zheng**

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**Karen Zhou**

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**Lin Zhou**

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**Alexander Zvonok**

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## Accreditation

Northeastern University has maintained its status as a member in good standing of the New England Commission of Higher Education, Inc. (NECHE), previously New England Association of Schools and Colleges (NEASC), since it was awarded its initial accreditation in 1940. The university was last reviewed by NECHE in 2018 and will be reviewed again in fall 2028.

### Bouvé College of Health Sciences

Program	Accrediting Agency
BA Public Health ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/community-health-behavioral-sciences/public-health-ba/">https://catalog.northeastern.edu/undergraduate/health-sciences/community-health-behavioral-sciences/public-health-ba/</a> )	Council on Education for Public Health (CEPH) ( <a href="https://ceph.org/">https://ceph.org/</a> )
BS Health Science ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/community-health-behavioral-sciences/health-science-bs/">https://catalog.northeastern.edu/undergraduate/health-sciences/community-health-behavioral-sciences/health-science-bs/</a> )	Council on Education for Public Health (CEPH) ( <a href="https://ceph.org/">https://ceph.org/</a> )
MPH Public Health (p. 710)	Council on Education for Public Health (CEPH) ( <a href="https://ceph.org/">https://ceph.org/</a> )
BSN Nursing ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/nursing-bsn/">https://catalog.northeastern.edu/undergraduate/health-sciences/nursing-bsn/</a> )	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
BSN Nursing ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/nursing-bsn/">https://catalog.northeastern.edu/undergraduate/health-sciences/nursing-bsn/</a> )	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
BSN Nursing—Transfer Track ( <a href="https://nextcatalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/">https://nextcatalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/</a> )	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
BSN Nursing—Transfer Track ( <a href="https://nextcatalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/">https://nextcatalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/</a> )	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
BSN Nursing—Transfer Track ( <a href="https://nextcatalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/">https://nextcatalog.northeastern.edu/undergraduate/health-sciences/nursing/nursing-bsn-transfer-track/</a> )	North Carolina Board of Nursing ( <a href="https://www.ncbon.com/">https://www.ncbon.com/</a> ) <sup>3</sup>
BSN Nursing, Accelerated Program for Second-Degree Students ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/">https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/</a> ) <sup>2</sup>	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
BSN Nursing, Accelerated Program for Second-Degree Students ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/">https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/</a> ) <sup>2</sup>	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
BSN Nursing, Accelerated Program for Second-Degree Students ( <a href="https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/">https://catalog.northeastern.edu/undergraduate/health-sciences/nursing/accelerated-second-degree-students-bsn/</a> ) <sup>3</sup>	North Carolina Board of Nursing ( <a href="https://www.ncbon.com/">https://www.ncbon.com/</a> ) <sup>3</sup>
MS Nursing (p. 742)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
MS Nursing (p. 742)	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
MS Nursing—Direct Entry (p. 746)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
MS Nursing—Direct Entry (p. 746)	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
MS Nursing Leadership (p. 751)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
MS Nursing Leadership (p. 751)	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
DNP Nursing (p. 732)	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
DNP Nursing (p. 732)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
DNP Nurse Anesthesia (p. 731)	Council on Accreditation of Nurse Anesthesia Educational Programs (COA) ( <a href="https://www.coacrn.org/">https://www.coacrn.org/</a> )
DNP Nurse Anesthesia (p. 731)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
DNP Nursing Practice—Post-Master's (p. 735)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )

CAGS Nursing (multiple concentrations) ( <a href="https://nextcatalog.northeastern.edu/graduate/health-sciences/nursing/#programstext">https://nextcatalog.northeastern.edu/graduate/health-sciences/nursing/#programstext</a> )	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
Graduate Certificate Primary Care Nursing FNP (p. 754)	Commission on Collegiate Nursing Education (CCNE) ( <a href="https://www.aacnnursing.org/CCNE/">https://www.aacnnursing.org/CCNE/</a> )
Graduate Certificate Primary Care Nursing FNP (p. 754)	Massachusetts Board of Registration in Nursing ( <a href="https://www.mass.gov/orgs/board-of-registration-in-nursing/">https://www.mass.gov/orgs/board-of-registration-in-nursing/</a> ) <sup>2</sup>
MS Physician Assistant Studies (p. 676)	Accreditation Review Commission on Education for the Physician Assistant, Inc. (ARC-PA) ( <a href="http://www.arc-pa.org/">http://www.arc-pa.org/</a> )
MS Speech-Language Pathology (p. 669)	Council on Academic Accreditation in Audiology and Speech-Language Pathology (CAA) of the American Speech-Language-Hearing Association (ASHA) ( <a href="https://caa.asha.org/">https://caa.asha.org/</a> )
MS Speech-Language Pathology (p. 669)	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>1</sup>
DPT Physical Therapy (p. 680)	Commission on Accreditation in Physical Therapy Education (CAPTE) ( <a href="https://www.capteonline.org/">https://www.capteonline.org/</a> )
PharmD Pharmacy (p. 782)	Accreditation Council for Pharmacy Education (ACPE) ( <a href="https://www.acpe-accredit.org/">https://www.acpe-accredit.org/</a> )
PhD Counseling Psychology (p. 690)	American Psychological Association (APA) ( <a href="https://accreditation.apa.org/accredited-programs/?_gl=1*iljb96*_ga*Njl5Nzl0OTk4LjE2OTI3MjI0OTQ.*_ga_SZLGDJGNB*MTY5MjcyMjQ">https://accreditation.apa.org/accredited-programs/?_gl=1*iljb96*_ga*Njl5Nzl0OTk4LjE2OTI3MjI0OTQ.*_ga_SZLGDJGNB*MTY5MjcyMjQ</a> )
PhD School Psychology (p. 692)	American Psychological Association (APA) ( <a href="https://accreditation.apa.org/accredited-programs/?_gl=1*iljb96*_ga*Njl5Nzl0OTk4LjE2OTI3MjI0OTQ.*_ga_SZLGDJGNB*MTY5MjcyMjQ">https://accreditation.apa.org/accredited-programs/?_gl=1*iljb96*_ga*Njl5Nzl0OTk4LjE2OTI3MjI0OTQ.*_ga_SZLGDJGNB*MTY5MjcyMjQ</a> )
PhD School Psychology (p. 692)	National Association of School Psychologists (NASP) ( <a href="https://www.nasponline.org/">https://www.nasponline.org/</a> )
CAGS School Psychology (p. 694)	National Association of School Psychologists (NASP) ( <a href="https://www.nasponline.org/">https://www.nasponline.org/</a> )
CAGS School Psychology (p. 694) <sup>1</sup>	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>1</sup>

<sup>1</sup> The Massachusetts Department of Elementary and Secondary Education approves (not accredits) programs.

<sup>2</sup> The Massachusetts Board of Registration in Nursing approves (not accredits) programs.

<sup>3</sup> The North Carolina Board of Nursing approves (not accredits) programs.

## College of Arts, Media and Design

Program	Accrediting Agency
Master of Architecture (p. 205)	National Architectural Accreditation Board (NAAB) ( <a href="https://www.naab.org/">https://www.naab.org/</a> )

## College of Engineering

Program	Accrediting Agency
BSSBioE Bioengineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/bioengineering/bioengineering-bsbioe/">https://catalog.northeastern.edu/undergraduate/engineering/bioengineering/bioengineering-bsbioe/</a> )	The BS in Bioengineering is accredited by the Engineering Accreditation Commission of ABET, <a href="https://www.abet.org">https://www.abet.org</a> , under the commission's General Criteria and Program Criteria for Bioengineering and Biomedical and Similarly Named Engineering programs.
BSChE Chemical Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/chemical/chemical-engineering-bsche/">https://catalog.northeastern.edu/undergraduate/engineering/chemical/chemical-engineering-bsche/</a> )	The BS in Chemical Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">www.abet.org</a> ( <a href="http://www.abet.org">http://www.abet.org</a> ), under the commission's General Criteria and Program Criteria for Chemical, Biochemical, Biomolecular, and Similarly Named Engineering Programs.
BSCE Civil Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/civil-environmental/civil-engineering-bsce/">https://catalog.northeastern.edu/undergraduate/engineering/civil-environmental/civil-engineering-bsce/</a> )	The BS in Civil Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">www.abet.org</a> ( <a href="http://www.abet.org">http://www.abet.org</a> ), under the commission's General Criteria and Program Criteria for Civil and Similarly Named Engineering Programs.

BSCmpE Computer Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/electrical-computer/computer-engineering-bscompe/">https://catalog.northeastern.edu/undergraduate/engineering/electrical-computer/computer-engineering-bscompe/</a> )	The BS in Computer Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="https://www.abet.org">https://www.abet.org</a> , under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.
BSEE Electrical Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/electrical-computer/electrical-engineering-bsee/">https://catalog.northeastern.edu/undergraduate/engineering/electrical-computer/electrical-engineering-bsee/</a> )	The BS in Electrical Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="https://www.abet.org">https://www.abet.org</a> , under the commission's General Criteria and Program Criteria for Electrical, Computer, Communications, Telecommunication(s), and Similarly Named Engineering Programs.
BSEnvE Environmental Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/civil-environmental/environmental-engineering-bsenv/">https://catalog.northeastern.edu/undergraduate/engineering/civil-environmental/environmental-engineering-bsenv/</a> )	The BS in Environmental Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">www.abet.org</a> ( <a href="http://www.abet.org">http://www.abet.org</a> ), under the commission's General Criteria and Program Criteria for Environmental Engineering and Similarly Named Engineering Programs.
BSIE Industrial Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/mechanical-industrial/bsie/">https://catalog.northeastern.edu/undergraduate/engineering/mechanical-industrial/bsie/</a> )	The BS in Industrial Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">www.abet.org</a> ( <a href="http://www.abet.org">http://www.abet.org</a> ), under the commission's General Criteria and Program Criteria for Industrial and Similarly Named Engineering Programs.
BSME Mechanical Engineering ( <a href="https://catalog.northeastern.edu/undergraduate/engineering/mechanical-industrial/bsme/">https://catalog.northeastern.edu/undergraduate/engineering/mechanical-industrial/bsme/</a> )	The BS in Mechanical Engineering is accredited by the Engineering Accreditation Commission of ABET, <a href="http://www.abet.org">www.abet.org</a> ( <a href="http://www.abet.org">http://www.abet.org</a> ), under the commission's General Criteria and Program Criteria for Mechanical and Similarly Named Engineering Programs.

## College of Science

Program	Accrediting Agency
BS Biochemistry ( <a href="https://catalog.northeastern.edu/undergraduate/science/biochemistry/biochemistry-bs/">https://catalog.northeastern.edu/undergraduate/science/biochemistry/biochemistry-bs/</a> )	American Society for Biochemistry and Molecular Biology (ASBMB) ( <a href="https://www.asbmb.org">https://www.asbmb.org</a> )

## College of Professional Studies

Program	Accrediting Agency
BS Finance and Accounting Management ( <a href="https://catalog.northeastern.edu/professional-studies/bachelors-postbaccalaureate/finance-accounting-management/">https://catalog.northeastern.edu/professional-studies/bachelors-postbaccalaureate/finance-accounting-management/</a> ) <sup>1</sup>	AACSB International—The Association to Advance Collegiate Schools of Business ( <a href="https://www.aacsb.edu">https://www.aacsb.edu</a> )
BS Management ( <a href="https://catalog.northeastern.edu/professional-studies/bachelors-postbaccalaureate/management/">https://catalog.northeastern.edu/professional-studies/bachelors-postbaccalaureate/management/</a> ) <sup>1</sup>	AACSB International—The Association to Advance Collegiate Schools of Business ( <a href="https://www.aacsb.edu">https://www.aacsb.edu</a> )
BSET Computer Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 ( <a href="https://www.abet.org">https://www.abet.org</a> )
BSET Electrical Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 ( <a href="https://www.abet.org">https://www.abet.org</a> )
BSET Mechanical Engineering Technology	Accredited by the Technology Accreditation Commission of ABET, 111 Market Place Suite 1050 Baltimore, MD 21202-4012 Telephone: 410.347.7700 ( <a href="https://www.abet.org">https://www.abet.org</a> )
MS Organizational Leadership (with concentration in Project Management) (p. 886)	Project Management Institute's Global Accreditation Center ( <a href="https://www.pmi.org/global-accreditation-center">https://www.pmi.org/global-accreditation-center</a> )
MS Project Management (p. 889)	Project Management Institute's Global Accreditation Center ( <a href="https://www.pmi.org/global-accreditation-center">https://www.pmi.org/global-accreditation-center</a> )
MSLD Sports Leadership (p. 894)	Commission on Sport Management Accreditation ( <a href="https://www.cosmaweb.org">https://www.cosmaweb.org</a> )
Master of Arts in Teaching programs in: (p. 847)	
Elementary Education, 1–6	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu">https://www.doe.mass.edu</a> ) <sup>2</sup>
Sheltered English Immersion Administrator—Endorsement	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu">https://www.doe.mass.edu</a> )

Sheltered English Immersion Teacher—Endorsement	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Biology, 8–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Chemistry, 8–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Earth and Space Science, 8–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of English, 5–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of English as a Second Language (ESL), PreK–6, 5–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of History, 5–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Mathematics, 8–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Physics, 8–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Political Science/Political Philosophy, 8–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Social Science, 5–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>
Teacher of Students with Moderate Disabilities, PreK–8, 5–12	Massachusetts Department of Elementary and Secondary Education ( <a href="https://www.doe.mass.edu/">https://www.doe.mass.edu/</a> ) <sup>2</sup>

<sup>1</sup> Accredited under the aegis of the “sponsoring” full-time college.

<sup>2</sup> The Massachusetts Department of Elementary and Secondary Education approves (not accredits) programs.

## College of Social Sciences and Humanities

Program	Accrediting Agency
BS American Sign Language—English Interpreting ( <a href="https://catalog.northeastern.edu/undergraduate/social-sciences-humanities/cultures-societies-global-studies/american-sign-language-english-interpreting-bs/">https://catalog.northeastern.edu/undergraduate/social-sciences-humanities/cultures-societies-global-studies/american-sign-language-english-interpreting-bs/</a> )	Commission on Collegiate Interpreter Education ( <a href="http://www.ccie-accreditation.org/">http://www.ccie-accreditation.org/</a> )
MPA Public Administration (p. 1081)	Network of Schools of Public Policy, Affairs, and Administration ( <a href="https://www.naspaa.org/">https://www.naspaa.org/</a> )

## D'Amore-McKim School of Business

Program	Accrediting Agency
All programs offered in 2024–25	AACSB International—Association to Advance Collegiate Schools of Business ( <a href="https://www.aacsb.edu/">https://www.aacsb.edu/</a> )

## School of Law

Program	Accrediting Agency
JD Law (p. 804)	American Bar Association; Association of American Law Schools <sup>1</sup>

<sup>1</sup> The Association of American Law Schools is an elected membership organization, not an accrediting body.

## Authorizations

Northeastern University's degree-granting authority is rooted in its charter, which was established by an act of the Massachusetts Legislature in 1916.

### Campus Locations and Regulatory Agencies

In addition to accreditation by the New England Commission of Higher Education, Northeastern University is regulated by local authorities for its global campus network locations. These agencies are as follows:

- Arlington, Virginia
  - State Council of Higher Education for Virginia
- Charlotte, North Carolina
  - Board of Governors of the University of North Carolina
- Miami, Florida
  - Florida Commission for Independent Education
- Portland, Maine
  - Maine State Board of Education
- Oakland, California
  - Bureau for Private Postsecondary Education
- San Francisco, California
  - Bureau for Private Postsecondary Education
- San Jose, California
  - Bureau for Private Postsecondary Education
- Seattle, Washington
  - Washington Student Achievement Council
- Toronto, Ontario, Canada
  - Ministry of Colleges and Universities
- Vancouver, British Columbia, Canada
  - Ministry of Post-Secondary Education and Future Skills

### Required Disclosures

#### VIRGINIA

Northeastern has processes in place to ensure that student grievances are treated with respect and addressed in a fair and professional manner. Students can report concerns to the Office of Student Conduct and Conflict Resolution (<https://www.northeastern.edu/osccr/>) or the Office of the University Ombuds for Graduate Students (<https://graduateombuds.northeastern.edu/>). At the Arlington campus, students can contact the on-site student support specialist or the campus principal.

If a student's problem has not been resolved in pursuance of the Northeastern grievance policy, they may contact the State Council of Higher Education for Virginia. SCHEV representatives can be reached via telephone at (804) 225-2600; via fax at (804) 225-2604; at this website (<https://www.schev.edu/students/resources/student-complaints/>); or by mail at 101 N. 14th Street, 10th Floor, James Monroe Building, Richmond, VA 23219.

The Virginia State Approving Agency is the approving authority of education and training programs for Virginia. Our office investigates complaints of GI Bill® beneficiaries. While most complaints should initially follow the school grievance policy, if the situation cannot be resolved at the school, the beneficiary should contact our office via email [saa@dvs.virginia.gov](mailto:saa@dvs.virginia.gov). *GI Bill® is a registered trademark of the U.S. Department of Veterans Affairs. More information about education benefits offered by VA is available at the official U.S. government website at <http://www.benefits.va.gov/gibill>.* (<http://www.benefits.va.gov/gibill/>).

#### NORTH CAROLINA

Northeastern has been evaluated by the University of North Carolina and is licensed to conduct higher education degree activity in the state. The university's guaranty bond for unearned prepaid tuition is on file with the Board of Governors of the University of North Carolina and the Office of the General Counsel at Northeastern. North Carolina students may view a copy of the Tuition Guaranty Bond by contacting Northeastern's Risk Services at 716 Columbus Avenue (Columbus Place), Suite 301 CP, Boston, MA 02120.

If students are unable to resolve a complaint offered by the Northeastern grievance procedures, they can submit a complaint through the online student complaint form at <https://studentcomplaints.northcarolina.edu/form> (<https://studentcomplaints.northcarolina.edu/form/>), or by mail to North Carolina Post-Secondary Education Complaints, 140 Friday Center Drive, Chapel Hill, NC 27517. <https://www.northcarolina.edu/post-secondary-education-complaints/>.

#### FLORIDA

Northeastern University—Miami is accredited by the New England Commission of Higher Education and is provisionally licensed in the state of Florida by the Commission on Independent Education. Additional information regarding the institution may be obtained by contacting the

Commission for Independent Education, Department of Education, 325 West Gaines Street, Suite 1414, Tallahassee, Florida 32399-0400, toll-free telephone number (888) 224-6684.

The transferability of credits you earn at Northeastern is at the complete discretion of an institution to which you may seek to transfer. Acceptance of the degree you earn in the educational program is also at the complete discretion of the institution to which you may seek to transfer. If the credits or degree that you earn at this institution are not accepted at the institution to which you seek to transfer, you may be required to repeat some or all of your coursework at that institution. For this reason you should make certain that your attendance at this institution will meet your educational goals. This may include contacting an institution to which you may seek to transfer after attending Northeastern to determine if your credits or degree will transfer.

## CALIFORNIA

Any questions a student may have regarding this catalog that have not been satisfactorily answered by the institution may be directed to the Bureau for Private Postsecondary Education (<http://www.bppe.ca.gov>), 1747 N. Market Blvd., Ste. 225, Sacramento, CA 95834; P.O. Box 980818, West Sacramento, CA 95798-0818, (888) 370-7589, or by fax (916) 263-1897.

### **NOTICE CONCERNING TRANSFERABILITY OF CREDITS AND CREDENTIALS EARNED AT OUR INSTITUTION**

The transferability of credits you earn at Northeastern is at the complete discretion of an institution to which you may seek to transfer. Acceptance of the degree you earn in the educational program is also at the complete discretion of the institution to which you may seek to transfer. If the credits or degree that you earn at this institution are not accepted at the institution to which you seek to transfer, you may be required to repeat some or all of your coursework at that institution. For this reason you should make certain that your attendance at this institution will meet your educational goals. This may include contacting an institution to which you may seek to transfer after attending Northeastern to determine if your credits or degree will transfer.

The Office of Student Assistance and Relief is available to support prospective students, current students, or past students of private postsecondary educational institutions in making informed decisions, understanding their rights, and navigating available services and relief options. The office may be reached by calling (888) 370-7589 or by visiting <https://osar.bppe.ca.gov/>.

## WASHINGTON

Northeastern is authorized by the Washington Student Achievement Council and meets the requirements and minimum educational standards established for degree-granting institutions under the Degree-Granting Institutions Act. This authorization is subject to periodic review and authorizes Northeastern to offer specific degree programs. The council may be contacted for a list of currently authorized programs. Authorization by the council does not carry with it an endorsement by the council of the institution or its programs. Any person desiring information about the requirements of the act or the applicability of those requirements to the institution may contact the council at P.O. Box 43430, Olympia, WA 98504-3430 or by email at [degreeauthorization@wsac.wa.gov](mailto:degreeauthorization@wsac.wa.gov).

The transferability of credits earned at Northeastern is at the discretion of the receiving college, university, or other educational institution. Students considering transferring to any institution should not assume that credits earned in any program of study at Northeastern will be accepted by the receiving institution. Similarly, the ability of a degree, certificate, diploma, or other academic credential earned at Northeastern to satisfy an admission requirement of another institution is at the discretion of the receiving institution. Accreditation does not guarantee credentials or credits earned at Northeastern will be accepted by or transferred to another institution. To minimize the risk of having to repeat coursework, students should contact the receiving institution in advance for evaluation and determination of transferability of credits and/or acceptability of degrees, diplomas, or certificates earned. The Washington Student Achievement Council has authority to investigate student complaints against specific schools. WSAC may not be able to investigate every student complaint. Visit <http://www.wsac.wa.gov/student-complaints> (<http://www.wsac.wa.gov/student-complaints/>) for information regarding the WSAC complaint process.

## ONTARIO

### **Master of Science in Project Management (p. 889)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting July 28, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

### **Master of Science in Regulatory Affairs (p. 892)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting June 25, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

### **Master of Professional Studies in Analytics (p. 853)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting March 6, 2020. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

### **Master of Professional Studies in Informatics (p. 865)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting March 6, 2020. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Science in Information Systems (p. 598)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting July 28, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Science in Biotechnology (p. 947)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting September 14, 2021. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Science in Cyber-Physical Systems (p. 602)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting January 18, 2023. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Science in Bioinformatics (p. 938)**

This institution has been granted consent by the Minister of Colleges and Universities to offer this degree program for a five-year term starting January 18, 2023. Prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**BRITISH COLUMBIA****Master of Science in Computer Science (p. 368)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective July 7, 2019, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Align—Master of Science in Computer Science (p. )**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective July 7, 2019, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Science in Data Analytics Engineering (p. 545)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective November 29, 2021, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Science in Information Design and Data Visualization (p. 228)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective October 28, 2021, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**Master of Professional Studies in Analytics (p. 853)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective October 28, 2021, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**MASTER OF SCIENCE IN INFORMATION SYSTEMS (p. 598)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective March 3, 2023, having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (e.g., acceptable to potential employers, professional licensing bodies, or other educational institutions).

**MASTER OF professional studies in digital media (p. 860) (*including connect (p. 862)*)**

This program is offered under the written consent of the Minister of Post-Secondary Education and Future Skills effective June 6, 2023 having undergone a quality assessment process and been found to meet the criteria established by the minister. Nevertheless, prospective students are responsible for satisfying themselves that the program and the degree will be appropriate to their needs (for example, acceptable to potential employers, professional licensing bodies, or other educational institutions).

## Notifications and Disclosures

The *Northeastern University Catalog* contains the university's primary statements about approved academic programs and degree requirements, as authorized by the president or the Board of Trustees.

The *Northeastern University Catalog* contains current information about the university calendar, admissions, degree requirements, fees, and certain procedures and regulations; however, such information is not intended and should not be regarded to be contractual. Course information was current as of July 3, 2024. For updated course information, students and advisors should consult the Banner course catalog (<https://nubanner.neu.edu/StudentRegistrationSsb/ssb/term/termSelection/?mode=courseSearch>).

### Accreditation

Please visit the Accreditation (<https://catalog.northeastern.edu/graduate/appendix/statements-accreditation/>) page of this catalog for details of Northeastern University's accreditation status.

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### FAMILY EDUCATIONAL RIGHTS AND PRIVACY ACT

In accordance with the Family Educational Rights and Privacy Act of 1974, Northeastern University permits its students to inspect their records wherever appropriate and to challenge specific parts of them when they feel it is necessary to do so. Specific details of the law as it applies to Northeastern are discussed in this section of the catalog (p. 183).

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### PERSISTENCE RATES UNDER THE STUDENT RIGHT-TO-KNOW ACT

In the fall of 2023, the persistence rate for undergraduate students who entered in the fall 2022 cohort was 96.9%.

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### TUITION DEFAULT POLICY

In cases where the student defaults on their tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

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### NONDISCRIMINATION POLICIES

Northeastern University is committed to providing a living, learning, and working environment free from discrimination and harassment and does not discriminate on the basis of race, color, religion, religious creed, genetic information, sex (including on the basis of sex stereotypes, sex characteristics, pregnancy, or related conditions), gender, gender identity, gender expression, sexual orientation, age, national origin, ancestry, ethnicity, disability, or veteran or military status in admission to, access to, treatment in, or employment in its programs and activities. The university will not tolerate any conduct that violates rights guaranteed by law, or any of the university policies that prohibit discrimination, including the Policy on Equal Opportunity ([https://www.northeastern.edu/policies/pdfs/Policy\\_on\\_Equal\\_Opportunity.pdf](https://www.northeastern.edu/policies/pdfs/Policy_on_Equal_Opportunity.pdf)), Policy on Sexual and Gender-Based Harassment and Title IX ([https://policies.northeastern.edu/policy104/#\\_ga=21399120526780236931685972406-9222403871666097079](https://policies.northeastern.edu/policy104/#_ga=21399120526780236931685972406-9222403871666097079)), and the Policy on Non-Fraternization ([https://www.northeastern.edu/policies/pdfs/Policy\\_on\\_Non-Fraternization.pdf](https://www.northeastern.edu/policies/pdfs/Policy_on_Non-Fraternization.pdf)). Furthermore, university policy also includes prohibitions of retaliation for filing complaints of discrimination with the Office for University Equity and Compliance. Links to the university's nondiscrimination policies and its grievance procedures are available at the OUEC (<https://www.northeastern.edu/ouec/>). Inquiries regarding the university's nondiscrimination policies may be directed to:

Office for University Equity and Compliance (<https://ouec.northeastern.edu/>)  
Mark Jannoni, Assistant Vice President and Title IX Coordinator  
125 Richards Hall  
Northeastern University  
Boston, Massachusetts 02115  
617.373.4644  
[ouec@northeastern.edu](mailto:ouec@northeastern.edu)

The university strongly encourages any person to report information relating to alleged discrimination or harassment to the OUEC (<https://ouec.northeastern.edu/>) by completing the form available here ([https://cm.maxient.com/reportingform.php?NortheasternUniv&layout\\_id=7](https://cm.maxient.com/reportingform.php?NortheasternUniv&layout_id=7)) or through any of the contact options listed above. OUEC's policies, as well as other helpful information, can be found at the OUEC website (<https://ouec.northeastern.edu/>).

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**DISABILITY ACCESS SERVICES**

Disability Access Services (<https://drc.sites.northeastern.edu/>) provides a variety of disability-related services and accommodations to Northeastern University's students with disabilities.

Northeastern's compliance with Section 504 of the Rehabilitation Act of 1973 and the Americans with Disabilities Act of 1990 are coordinated by the senior director of Disability Access Services. Persons requiring information regarding Disability Access Services should contact the center at 617.373.2675 or at [DASBoston@northeastern.edu](mailto:DASBoston@northeastern.edu).

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**CLERY ACT**

Northeastern University is committed to assisting all members of the university community in providing for their own safety and security. Information regarding campus security and personal safety, including topics such as crime prevention, university police law enforcement authority, crime reporting policies, crime statistics for the most recent three-year period, and disciplinary procedures, is available in the Annual Security & Fire Safety Reports, located on the NUPD website (<https://nupd.northeastern.edu/annual-reports/>).

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**EMERGENCY INFORMATION**

The university is prepared to respond to emergencies and urgent situations that require immediate action with a trained team of police officers, EMTs, health and counseling experts, student affairs and residential life staff, and other professionals from a coordinated group that is able to manage a wide range of potential situations.

In case of emergency or crisis situations that require immediate notification, university officials will deploy the NU Alert system, which sends email, voicemail, and text messages to students, faculty, and staff. NU Alert is intended to communicate pertinent information and, when appropriate, provide directions to those in the affected area(s).

A record of past Timely Warning and NU Alert Emergency Notifications for our campus community can be found on the NUPD website (<https://nupd.northeastern.edu/safety-notifications/>).

Examples of crisis situations range from snowstorms to national emergencies that have a local impact.

Additional information on the university's emergency information systems can be found on the university's Emergency information (<https://www.northeastern.edu/emergency-information/>) website.

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**MISSION STATEMENT**

To educate students for a life of fulfillment and accomplishment.

To create and translate knowledge to meet global and societal needs.

## Major CIP Codes

The following is a list of Northeastern University majors for programs accepting new students during the 2024-2025 catalog year, along with each major's corresponding CIP code. "CIP" refers to the Classification of Instructional Programs published by the U.S. Department of Education's National Center for Education Statistics (<https://nces.ed.gov/ipeds/cipcode/Default.aspx?y=56>).

Academic Program	Major Transcript Title	Major Cip Code
P-CERTG-3DAN: 3D Animation, Graduate Certificate	3D Animation	100304
CERTG-ACFD: Accounting and Financial Decision Making, Graduate Certificate	Accntng Fin Decision Making	520899
CERTG-ACFD-O: Accounting and Financial Decision Making—Online Program, Graduate Certificate	Accntng Fin Decision Making	520899
MSA-ACCT: Accounting, MSA	Accounting	520301
P-CERTU-ACCT: Accounting, Undergraduate Certificate	Accounting	520301
P-CERTU-AACT: Advanced Accounting, Undergraduate Certificate	Advanced Accounting	520301
MS-AIMF: Advanced and Intelligent Manufacturing, MS	Advanced and Intelligent Mfg	143601
P-BS-AVMS: Advanced Manufacturing Systems, BS	Advanced Manufacturing Systems	150613
BA-AFMS: Africana Studies and Media and Screen Studies, BA	Africana St/Media Screen St	050201
BA-AFHS: Africana Studies and Human Services, BA	Africana Stud/Human Services	050201
BA-AFCS: Africana Studies, BA	Africana Studies	050201
BS-AFCS: Africana Studies, BS	Africana Studies	050201
BA-AFEN: Africana Studies and English, BA	Africana Studies/English	050201
BA-AFJO: Africana Studies and Journalism, BA	Africana Studies/Journalism	050201
BA-APPS: Africana Studies and Political Science, BA	Africana Studies/Political Sci	050201
P-CERTG-AGPM: Agile Project Management, Graduate Certificate	Agile Project Management	520211
CERTG-AIAP: AI Applications, Graduate Certificate	AI Applications	110105
P-BS-ANLY: Analytics, BS	Analytics	110802
P-CERTU-ANLY: Analytics, Undergraduate Certificate	Analytics	110802
P-MPS-ANLY: Analytics, MPS	Analytics	110802
MS-AQMS: Applied Quantitative Methods and Social Analysis, MS	Appl Quant Methods Soc Anlys	450102
P-CERTG-APAN: Applied Analytics, Graduate Certificate	Applied Analytics	307101
CAGS-ABA: Applied Behavior Analysis, CAGS	Applied Behavior Analysis	422814
CERTG-ABA: Applied Behavior Analysis, Graduate Certificate	Applied Behavior Analysis	422814
MS-ABA: Applied Behavior Analysis, MS	Applied Behavior Analysis	422814
MS-AEPP: Applied Educational Psychology, MS	Applied Educational Psychology	422805
P-MPS-APLG: Applied Logistics, MPS	Applied Logistics	520203
P-MPS-APMI: Applied Machine Intelligence, MPS	Applied Machine Intelligence	521301
CERTG-AMTH: Applied Mathematics, Graduate Certificate	Applied Mathematics	270301
MS-AMTH: Applied Mathematics, MS	Applied Mathematics	270301
MS-APNR: Applied Nursing Research, MS	Applied Nursing Research	513808

BS-APHY: Applied Physics, BS	Applied Physics	400801
MS-APEN: Applied Physics and Engineering, MS	Applied Physics/Engineering	400801
BA-APPS: Applied Psychology, BA	Applied Psychology	422813
MS-APPS: Applied Psychology, MS	Applied Psychology	422813
BS-ARCS: Architectural Studies, BS	Architectural Studies	040801
BS-ARSD: Architectural Studies and Design, BS	Architectural Studies/Design	040803
BS-ARCH: Architecture, BS	Architecture	040902
MARCH-ARCH1: Master of Architecture—One-Year Program	Architecture	040902
MARCH-ARCH2: Master of Architecture—Two-Year Program	Architecture	040902
MARCH-ARCH3: Master of Architecture—Three-Year Program	Architecture	040902
MARCH-ARCH3A: Master of Architecture—Three-Year Program—Advanced Degree Entrance	Architecture	040902
BS-AENG: Architecture and English, BS	Architecture/English	040201
BA-ARTS: Art, BA	Art	500702
MS-ARIN: Artificial Intelligence	Artificial Intelligence	110102
MS-ARIN-AL: Artificial Intelligence, MS—Align Program	Artificial Intelligence	110102
MS-AMCE: Arts Administration and Cultural Entrepreneurship, MS	Arts Adm Cultural Entrepren	501099
CERTG-ARAD: Arts Administration, Graduate Certificate	Arts Administration	501099
BA-ASST: Asian Studies, BA	Asian Studies	050103
BS-ASLI: American Sign Language—English Interpreting, BS	ASL - English Interpreting	161601
BS-ASHU: American Sign Language and Human Services, BS	ASL/Human Services	161601
BS-ASLN: American Sign Language and Linguistics, BS	ASL/Linguistics	161601
BS-ASPS: American Sign Language and Psychology, BS	ASL/Psychology	161601
BS-ASTH: American Sign Language and Theatre, BS	ASL/Theatre	161601
BS-BNPH: Behavioral Neuroscience and Philosophy, BS	Behav Neuroscience/Philosophy	261501
BS-BENS: Behavioral Neuroscience, BS	Behavioral Neuroscience	261501
BS-BNDS: Behavioral Neuroscience and Design, BS	Behavioral Neuroscience/Design	261501
BS-BIOC: Biochemistry, BS	Biochemistry	260202
CERTG-BDBS: Biodefense and Biosecurity, Graduate Certificate	Biodefense and Biosecurity	261201
BSBIOE-BION: Bioengineering, BSBioE	Bioengineering	149999
MSBIOE-BION: Bioengineering, MSBioE	Bioengineering	149999
PHD-BION: Bioengineering, PhD	Bioengineering	149999
PHD-BION-A: Bioengineering, PhD—Advanced Entry	Bioengineering	149999
BSBIOE-BEBC: Bioengineering and Biochemistry, BSBioE	Bioengineering/Biochemistry	149999
CERTG-BINF: Bioinformatics, Graduate Certificate	Bioinformatics	261103
MS-BINF: Bioinformatics, MS	Bioinformatics	261103
MS-BINF-EX: Bioinformatics, MS—Experiential	Bioinformatics	261103
P-BS-BIOS: Biological Science, BS	Biological Science	260101
BS-BIOL: Biology, BS	Biology	260101
MS-BIOL: Biology, MS	Biology	260101

PHD-BIOL: Biology, PhD	Biology	260101
PHD-BIOL-A: Biology, PhD-Advanced Entry	Biology	260101
BS-BENG: Biology and English, BS	Biology/English	269999
BS-BIMA: Biology and Mathematics, BS	Biology/Mathematics	260101
BS-BIPO: Biology and Political Science, BS	Biology/Political Science	269999
BS-BIMP: Biomedical Physics, BS	Biomedical Physics	260203
MS-BIOM: Biomedical Science, MS	Biomedical Science	260102
PHD-BIOM: Biomedical Science, PhD	Biomedical Science	260102
PHD-BIOM-A: Biomedical Science, PhD—Advanced Entry	Biomedical Science	260102
CERTG-BIAS: Biopharmaceutical Analytical Sciences, Graduate Certificate	Biopharm Analytical Sci	400599
P-CERTG-BPRA: Biopharmaceutical Regulatory Affairs, Graduate Certificate	Biopharmaceutical Reg Affairs	512099
P-CERTG-BPQI: International Biopharmaceutical Regulatory Affairs, Graduate Certificate	Biopharmacy Quality Intl	512099
CERTG-BIOT: Biotechnology, Graduate Certificate	Biotechnology	261201
MS-BIOT-EX: Biotechnology, MS – Experiential	Biotechnology	261201
MS-BIOT-SC: Biotechnology, MS	Biotechnology	261201
P-BS-BIOT: Biotechnology, BS	Biotechnology	261201
CERTG-BITE: Biotechnology Enterprise, Graduate Certificate	Biotechnology Enterprise	261201
CERTG-RESC: Biotechnology Regulatory Science, Biotechnology Regulatory Sci Graduate Certificate	Biotechnology Regulatory Sci	512004
CERTG-BLCE: Blockchain and Smart Contract Engineering, Graduate Certificate	Blockchain Smart Contr. Engr	140903
CERTG-BMGT: Brand Management, Graduate Certificate	Brand Management	521401
CERTG-TBWS: Broadband Wireless Systems, Graduate Certificate	Broadband Wireless Systems	110901
BS-BALW: Business Administration and Law, BS	Business Admin and Law	520101
BS-BACS: Business Administration and Communication Studies, BS	Business Admin/Comm Studies	520101
BS-BACJ: Business Administration and Criminal Justice, BS	Business Admin/Crim Justice	520101
BS-BAPS: Business Administration and Psychology, BS	Business Admin/Psychology	520101
BS-BAPH: Business Administration and Public Health, BS	Business Admin/Public Health	520101
BSBA-BSAD: Business Administration, BSBA	Business Administration	520101
CERTG-BSAD: Business Administration, Graduate Certificate	Business Administration	520101
CERTG-BSAD-O: Business Administration—Online Program, Graduate Certificate	Business Administration	520101
MBA-BSAD2-O: Business Administration, MBA—Online	Business Administration	520101
MBA-BSAD-E: Business Administration, MBA—Part-Time	Business Administration	520101
MBA-BSAD-F: Business Administration, MBA—Full-Time	Business Administration	520101
MBA-BSAD-O: Business Administration, MBA—Online Program	Business Administration	520101
BS-BUDE: Business Administration and Design, BS	Business Administration/Design	520101
CERTG-BUSA: Business Analytics, Graduate Certificate	Business Analytics	521302
MS-BUSA: Business Analytics, MS	Business Analytics	521302

MS-BUSA-O: Business Analytics, MS—Online	Business Analytics	521302
CERTG-BLAW: Business Law, Graduate Certificate	Business Law	220205
CERTG-HECA: Business Management for Healthcare, Graduate Certificate	Business Mgmt for Healthcare	521099
MS-CGTH: Cell and Gene Therapies, MS	Cell and Gene Therapies	260806
BS-CMBI: Cell and Molecular Biology, BS	Cell and Molecular Biology	260406
BSCHE-CEBE: Chemical Engineering and Bioengineering, BSChE	Chem Engineer/Bioengineering	140701
BSCHE-CHOC: Chemical Engineering and Biochemistry, BSChE	Chem Engineering/Biochemistry	140701
BSCHE-CHME: Chemical Engineering, BSChE	Chemical Engineering	140701
MSCHE-CHME: Chemical Engineering, MSChE	Chemical Engineering	140701
PHD-CHME: Chemical Engineering, PhD	Chemical Engineering	140701
PHD-CHME-A: Chemical Engineering, PhD—Advanced Entry	Chemical Engineering	140701
BSCHE-CHCS: Chemical Engineering and Computer Science, BSChE	Chemical Engineering/Comp Sci	140701
BSCHE-CEDS: Chemical Engineering and Data Science, BSChE	Chemical Engineering/Data Sci	140701
BSCHE-CEPH: Chemical Engineering and Physics, Chemical Engineering/Physics BSChE	Chemical Engineering/Physics	140701
BSCHE-CEE: Chemical Engineering and Environmental Engineering, BSChE	Chemical Engr/Environ Engr	140701
BS-CHEM: Chemistry, BS	Chemistry	400501
MS-CHEM: Chemistry, MS	Chemistry	400501
PHD-CHEM: Chemistry, PhD	Chemistry	400501
PHD-CHEM-A: Chemistry, PhD—Advanced Entry	Chemistry	400501
PHD-CEEN: Civil and Environmental Engineering, PhD	Civil Environmental Engineer	140801
PHD-CEEN-A: Civil and Environmental Engineering, PhD—Advanced Entry	Civil Environmental Engineer	140801
BSCE-CEAS: Civil Engineering and Architectural Studies, BSCE	Civil Eng/Arch Studies	140801
BSCE-CIVE: Civil Engineering, BSCE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering with Concentration in Construction Management, MSCivE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering with Concentration in Structures, MSCivE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering with Concentration in Transportation, MSCivE	Civil Engineering	140801
MSCIVE-CIVE: Civil Engineering with Concentration in Data and Systems, MSCivE	Civil Engineering	140801
PHD-CIVE: Civil Engineering, PhD	Civil Engineering	140801
PHD-CIVE-A: Civil Engineering, PhD—Advanced Entry	Civil Engineering	140801
BSCE-CVCS: Civil Engineering and Computer Science, BSCE	Civil Engineering/Computer Sci	140801
CERTG-CLEN: Climate and Engineering, Graduate Certificate	Climate and Engineering	141401
MS-CLSE: Climate Science and Engineering, MS	Climate Sci and Engineering	141401

P-CERTG-CCAM: Cloud Computing Application and Management, Graduate Certificate	Cloud Computing App and Mgmt	110104
CERTG-CLSD: Cloud Software Development, Graduate Certificate	Cloud Software Development	110902
P-CERTG-CATH: Collegiate Athletics Administration, Graduate Certificate	Collegiate Athletics Admin	310504
BA-CMGR: Communication Studies and Graphic and Information Design, BA	Comm Stud/Graph Info Design	090101
BS-CMSL: Communication Studies and Speech-Language Pathology and Audiology	Comm Stud/Speech-Lang Path Aud	090101
BA-CMSO: Communication Studies and Sociology, BA	Comm Studies/Sociology	090199
BA-CMTH: Communication Studies and Theatre, BA	Comm Studies/Theatre	090199
P-MS-COED: Commerce and Economic Development, MS	Commerce Economic Developmnt	450603
BA-CMME: Communication and Media Studies, BA	Communication Media Studies	090199
BA-CMST: Communication Studies, BA	Communication Studies	090101
BS-CMDE: Communication Studies and Design, BS	Communication Studies/Design	090101
BS-CSBA: Computer Science and Business Administration, BS	Comp Sci/Business Admin	110101
BS-CSCP: Computer Science and Cognitive Psychology, BS	Comp Sci/Cognitive Psyc	110101
BS-CSES: Computer Science and Environmental and Sustainability Sciences, BS	Comp Sci/Environ and Sust Sci	110101
BS-CSMA: Computer Science and Mathematics, BS	Comp Sci/Mathematics	110101
BS-CSPP: Computer Science and Politics, Philosophy, and Economics, BS	Comp Sci/Politics, Phil Econ	110101
BS-CSSL: Computer Science and Speech-Language Pathology and Audiology, BS	Comp Sci/Speech-Lng Pth Aud	110101
MS-CNAN: Complex Network Analysis, MS	Complex Network Analysis	300601
CERTG-COSS: Computational Social Science, Graduate Certificate	Computational Social Science	305202
BSCMPE-CMPE: Computer Engineering, BSCmpE	Computer Engineering	140901
PHD-CMPE: Computer Engineering, PhD	Computer Engineering	140901
PHD-CMPE-A: Computer Engineering, PhD-Advanced Entry	Computer Engineering	140901
BSCMPE-CMPH: Computer Engineering and Physics, BSCmpE	Computer Engineering/Physics	140901
BSCMPE-CECS: Computer Engineering and Computer Science, BSCmpE	Computer Engr/Computer Science	140901
BS-CSBN: Computer Science and Behavioral Neuroscience, BS	Computer Sci/Behavior Neurosci	110101
BS-CSCS: Computer Science and Communication Studies, BS	Computer Sci/Communication Stu	110101
BS-CSCJ: Computer Science and Criminal Justice, BS	Computer Sci/Criminal Justice	110101
BS-CGDV: Computer Science and Game Development, BS	Computer Sci/Game Development	110101
BS-CSMU: Computer Science and Music, BS	Computer Sci/Music	110101
BS-CSMU-MUTE: Computer Science and Music with Concentration in Music Technology, BS	Computer Sci/Music	110101
BS-CSPL: Computer Science and Philosophy, BS	Computer Sci/Philosophy	110101
BS-CSPY: Computer Science and Physics, BS	Computer Sci/Physics	110101

BS-CSPO: Computer Science and Political Science, BS	Computer Sci/Political Sci	110101
BS-CSSO: Computer Science and Sociology, BS	Computer Sci/Sociology	110101
BACS-CSCI: Computer Science, BACS	Computer Science	110101
BSCS-CSCI: Computer Science, BSCS	Computer Science	110101
BSCS-CYBO: Computer Science with Concentration in Cyber Operations, BSCS	Computer Science	110101
CERTG-CSCI: Computer Science, Graduate Certificate	Computer Science	110101
MSCS-CSCI: Computer Science, MSCS	Computer Science	110101
MSCS-CSCI-AL: Computer Science, MSCS—Align	Computer Science	110101
PHD-CSCI: Computer Science, PhD	Computer Science	110101
PHD-CSCI-A: Computer Science, PhD—Advanced Entry	Computer Science	110101
BS-CSBI: Computer Science and Biology, BS	Computer Science/Biology	110101
BS-CSDE: Computer Science and Design, BS	Computer Science/Design	110101
BS-CSEC: Computer Science and Economics, BS	Computer Science/Economics	110101
BS-CSEG: Computer Science and English, BS	Computer Science/English	110101
BS-CSHI: Computer Science and History, BS	Computer Science/History	110101
BS-CSJO: Computer Science and Journalism, BS	Computer Science/Journalism	110101
BS-CSLI: Computer Science and Linguistics, BS	Computer Science/Linguistics	110101
BS-CSME: Computer Science and Media Arts, BS	Computer Science/Media Arts	110101
BS-CSTH: Computer Science and Theatre, BS	Computer Science/Theatre	110101
BS-CPLW: Computing and Law, BS	Computing and Law	110101
P-CERTG-CONM: Construction Management, Graduate Certificate	Construction Management	460412
P-MS-CORC: Corporate and Organizational Communication, MS	Corporate Org Communication	090101
CERTG-COFN: Corporate Finance, Graduate Certificate	Corporate Finance	520801
CERTG-COFN-O: Corporate Finance, Graduate Certificate—Online	Corporate Finance	520801
CERTG-COIN: Corporate Innovation, Graduate Certificate	Corporate Innovation	520210
CERTG-CPRN: Corporate Renewal, Graduate Certificate	Corporate Renewal	520799
CERTG-CPRN-O: Corporate Renewal, Graduate Certificate—Online	Corporate Renewal	520799
CAGS-COPS: Counseling Psychology, CAGS	Counseling Psychology	422803
MSCP-COPS: Counseling Psychology, MSCP	Counseling Psychology	422803
PHD-COPS-MSE: Counseling Psychology, PhD	Counseling Psychology	422803
MS-CCMD: Creative Collaboration and Multidisciplinary Design, MS	Creatv Collab Multidisc Dsgn	501099
CERTG-CRAM: Crime Analysis and Mapping, Graduate Certificate	Crime Analysis and Mapping	430408
BS-CRJO: Criminal Justice and Journalism, BS	Criminal Justice/Journalism	430104
BS-CJPH: Criminal Justice and Philosophy, BS	Criminal Justice/Philosophy	430104
BS-CRPO: Criminal Justice and Political Science, BS	Criminal Justice/Political Sci	430104
BS-CJPS: Criminal Justice and Psychology, BS	Criminal Justice/Psychology	430199
BS-CRSO: Criminal Justice and Sociology, BS	Criminal Justice/Sociology	430104
BS-CRCJ: Criminology and Criminal Justice, BS	Criminology Criminal Justice	430104
MS-CRCJ: Criminology and Criminal Justice, MS	Criminology Criminal Justice	430104
PHD-CRJP: Criminology and Justice Policy, PhD	Criminology and Justice Policy	430104
PHD-CRJP-A: Criminology and Justice Policy, PhD—Advanced Entry	Criminology and Justice Policy	430104

P-CERTG-CCCM: Cross-Cultural Communication, Graduate Certificate	Cross-Cultural Communication	090100
BA-CAPH: Cultural Anthropology and Philosophy, BA	Cultural Anthro/Philosophy	450204
BA-CARS: Cultural Anthropology and Religious Studies, BA	Cultural Anthro/Religious Stud	450204
BA-CUAN: Cultural Anthropology, BA	Cultural Anthropology	451101
BS-CUAN: Cultural Anthropology, BS	Cultural Anthropology	451101
BA-CUTH: Cultural Anthropology and Theatre, BA	Cultural Anthropology/Theatre	451101
CERTG-CUEN: Cultural Entrepreneurship, Graduate Certificate	Cultural Entrepreneurship	501099
MS-CYPS: Cyber-Physical Systems, MS	Cyber-Physical Systems	140903
BS-CYBS: Cybersecurity, BS	Cybersecurity	111003
CERTG-CYBS: Cybersecurity, Graduate Certificate	Cybersecurity	111003
MS-CYBS: Cybersecurity, MS	Cybersecurity	111003
MS-CYBS-AL: Cybersecurity, MS—Align	Cybersecurity	111003
PHD-CYBS: Cybersecurity, PhD	Cybersecurity	111003
PHD-CYBS-A: Cybersecurity, PhD—Advanced Entry	Cybersecurity	111003
BS-CYBB: Cybersecurity and Business Administration, BS	Cybersecurity/Business Admin	111003
BS-CYCJ: Cybersecurity and Criminal Justice, BS	Cybersecurity/Criminal Justice	111003
BS-CYEC: Cybersecurity and Economics, BS	Cybersecurity/Economics	111003
CERTG-DAAN: Data Analytics, Graduate Certificate	Data Analytics	110802
CERTG-DAAE: Data Analytics Engineering, Graduate Certificate	Data Analytics Engineering	149999
MS-DAAE: Data Analytics Engineering, MS	Data Analytics Engineering	149999
MS-DAAE-EX: Data Analytics Engineering, MS—Experiential	Data Analytics Engineering	149999
MS-DAAE-O: Data Analytics Engineering, MS—Online	Data Analytics Engineering	149999
MS-DAMG: Data Architecture and Management, MS	Data Architecture Management	110802
BS-DSEE: Data Science and Ecology and Evolutionary Biology, BS	Data Sci/Ecology Evol Bio	110802
BS-DSES: Data Science and Environmental and Sustainability Sciences, BS	Data Sci/Environ and Sust Sci	110802
BS-DSSL: Data Science and Speech-Language Pathology and Audiology, BS	Data Sci/Speech-Lng Pth Aud	110802
BS-DASC: Data Science, BS	Data Science	110802
MS-DASC: Data Science, MS	Data Science	110802
MS-DASC-AL: Data Science, MS—Align	Data Science	110802
BS-DSBN: Data Science and Behavioral Neuroscience, BS	Data Science/Behavioral Neuro	110802
BS-DSBC: Data Science and Biochemistry, BS	Data Science/Biochemistry	110802
BS-DSBL: Data Science and Biology, BS	Data Science/Biology	110802
BS-DSBA: Data Science and Business Administration, BS	Data Science/Business Admin	110802
BS-DSCH: Data Science and Chemistry, BS	Data Science/Chemistry	110802
BS-DSCJ: Data Science and Criminal Justice, BS	Data Science/Criminal Justice	110802
BS-DSDE: Data Science and Design, BS	Data Science/Design	110802
BS-DSEC: Data Science and Economics, BS	Data Science/Economics	110802
BS-DSHS: Data Science and Health Science, BS	Data Science/Health Science	110802
BS-DSIA: Data Science and International Affairs, BS	Data Science/Intl Affairs	110802

BS-DSJO: Data Science and Journalism, BS	Data Science/Journalism	110802
BS-DSL1: Data Science and Linguistics, BS	Data Science/Linguistics	110802
BS-DSMA: Data Science and Mathematics, BS	Data Science/Mathematics	110802
BS-DSPL: Data Science and Philosophy, BS	Data Science/Philosophy	110802
BS-DSPH: Data Science and Physics, BS	Data Science/Physics	110802
BS-DSPS: Data Science and Psychology, BS	Data Science/Psychology	110802
BS-DSPB: Data Science and Public Health, BS	Data Science/Public Health	110802
BFA-DESN: Design, BFA	Design	500409
BS-DEMA: Design and Mathematics, BS	Design/Mathematics	500409
BS-DETH: Design and Theatre, BS	Design/Theatre	500409
P-BS-DIME: Digital Communication and Media, BS	Digital Communication Media	090702
CERTG-DHUM: Digital Humanities, Graduate Certificate	Digital Humanities	240103
P-MPS-DGM-AL: Digital Media, MPS—Connect	Digital Media	090702
P-MPS-DGME: Digital Media, MPS	Digital Media	090702
P-CERTG-DGMM: Digital Media Management, Graduate Certificate	Digital Media Management	100105
P-CERTG-DGVD: Digital Video, Graduate Certificate	Digital Video	500602
MA-ECED: Early Childhood Education, MA	Early Childhood Education	131210
CERTG-EINT: Early Intervention, Graduate Certificate	Early Intervention	131099
BS-EEBI: Ecology and Evolutionary Biology, BS	Ecology Evolutionary Biology	261310
BA-ECON: Economics, BA	Economics	450603
BS-ECON: Economics, BS	Economics	450603
MS-ECON: Economics, MS	Economics	450603
PHD-ECON: Economics, PhD	Economics	450603
PHD-ECON-A: Economics, PhD—Advanced Entry	Economics	450603
BS-ECBA: Economics and Business Administration, BS	Economics/Business Admin	450603
BS-ECHS: Economics and Human Services, BS	Economics/Human Services	450603
BS-ECIB: Economics and International Business, BS	Economics/Intl Business	450603
BS-ECJO: Economics and Journalism, BS	Economics/Journalism	450603
BS-ECMA: Economics and Mathematics, BS	Economics/Mathematics	450603
BS-ECPH: Economics and Philosophy, BS	Economics/Philosophy	450603
BS-ECPS: Economics and Psychology, BS	Economics/Psychology	450603
P-EDD-EDUC: Education, EdD	Education	130101
P-MED-EDUC: Education, Med	Education	130101
P-CAGS-EDLM: Education Leadership Management, CAGS	Education Leadership Mgmt	130401
MA-EDLD: Educational Leadership, MA	Educational Leadership	130401
MSECEL-ECEL: Electrical and Computer Engineering Leadership, MSECEL	Elec and Comp Engr Leadership	141001
BSCMP-EELCE: Electrical and Computer Engineering, BSCmpE	Electrical and Computer Engr	141001
BSEE-ELCE: Electrical and Computer Engineering, Electrical and Computer Engr	Electrical and Computer Engr	141001
BSEE		
BSEE-ELEE: Electrical Engineering, BSEE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE	Electrical Engineering	141001

MSECE-ELEE: Electrical and Computer Engineering with Concentration in Computer Networks and Security, MSECE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Power Systems, MSECE	Electrical Engineering	141001
MSECE-ELEE: Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE	Electrical Engineering	141001
PHD-ELEE: Electrical Engineering, PhD	Electrical Engineering	141001
PHD-ELEE-A: Electrical Engineering, PhD—Advanced Entry	Electrical Engineering	141001
BSEE-EEMU: Electrical Engineering and Music with Concentration in Music Technology, BSEE	Electrical Engineering/Music	141001
BSEE-EEPH: Electrical Engineering and Physics, BSEE	Electrical Engineering/Physics	141001
P-MAT-ELED: Elementary Education, MAT	Elementary Education	131202
CERTG-ENES: Energy Systems, Graduate Certificate	Energy Systems	142701
MSENES-AL: Energy Systems, MSENES—Academic Link	Energy Systems	142701
MSENES-ENES: Energy Systems, MSENES	Energy Systems	142701
CERTG-ENSY: Energy Systems Management, Graduate Certificate	Energy Systems Management	142701
MS-CEPP: Engineering and Public Policy, MS	Engineering and Public Policy	140899
MS-CEPP: Engineering and Public Policy with Concentration in Energy Environment, MS	Engineering and Public Policy	140899
MS-CEPP: Engineering and Public Policy with Concentration in Infrastructure Resilience, MS	Engineering and Public Policy	140899
CERTG-ENBU: Engineering Business, Graduate Certificate	Engineering Business	140101
CERTG-EEDM: Engineering Economic Decision Making, Graduate Certificate	Engineering Economic Decision	140101
CERTG-ENLR: Engineering Leadership, Graduate Certificate	Engineering Leadership	141001
CERTG-ENGM: Engineering Management, Graduate Certificate	Engineering Management	140101
MSEM-ENGM: Engineering Management, MSEM	Engineering Management	140101
MSEM-ENGM-EX: Engineering Management, MSEM—Experiential	Engineering Management	140101
CERTG-ETSM: Technology Systems Management, Graduate Certificate	Engineering Tech Systems Mgmt	140101
BA-ENGL: English, BA	English	230101
MA-ENGL: English, MA	English	230101
PHD-ENGL: English, PhD	English	230101

PHD-ENGL-A: English, PhD—Advanced Entry	English	230101
BA-ENCO: English and Communication Studies, BA	English/Communication Studies	230101
BA-ENCJ: English and Criminal Justice, BA	English/Criminal Justice	230101
BA-ENCA: English and Cultural Anthropology, BA	English/Cultural Anthropology	230101
BA-ENDE: English and Design, BA	English/Design	230101
BA-ENGD: English and Graphic and Information Design, BA	English/Graphic Info Design	230101
BA-EPHI: English and Philosophy, BA	English/Philosophy	230101
BA-ENPS: English and Political Science, BA	English/Political Science	230101
BA-ENTH: English and Theatre, BA	English/Theatre	230101
CERTG-ENTR: Entrepreneurship, Graduate Certificate	Entrepreneurship	520701
BS-ESJO: Environmental and Sustainability Sciences and Journalism, BS	Environ Sust Sci/Journalism	030104
BS-ESCH: Environmental and Sustainability Sciences and Chemistry, BS	Environ and Sust Sci/Chemistry	030104
BS-ESEC: Environmental and Sustainability Sciences and Economics, BS	Environ and Sust Sci/Economics	030104
BS-ESLA: Environmental and Sustainability Sciences and Landscape Architecture, BS	Environ and Sust Sci/Land Arch	030104
BSENV-EECH: Environmental Engineering and Chemical Engineering, BSEnvE	Environ Engr/Chemical Engr	140801
BSENV-ENVI: Environmental Engineering, BSEnvE	Environmental Engineering	140801
MSENV-ENVI: Environmental Engineering, MSEnvE	Environmental Engineering	140801
BSENV-EEDS: Environmental Engineering and Data Science, BSEnvE	Environmental Engr/Data Sci	140801
BSENV-ENHS: Environmental Engineering and Health Science, BSEnvE	Environmental Engr/Health Sci	140801
MS-ENPP: Environmental Science and Policy, MS	Environmental Science Policy	030103
BA-ENVS: Environmental Studies, BA	Environmental Studies	030103
BS-ENSS: Environmental and Sustainability Sciences, BS	Environmtl Sustain Sciences	030104
BSENV-EELA: Environmental Engineering and Landscape Architecture, BSEnvE	Environmtl Engr/Landscape Arch	140801
BA-ENHI: Environmental Studies and History, BA	Environmtl Studies/History	030103
BA-ENIA: Environmental Studies and International Affairs, BA	Environmtl Studies/Intl Affair	030103
BA-ENPH: Environmental Studies and Philosophy, BA	Environmtl Studies/Philosophy	030103
BA-ENPO: Environmental Studies and Political Science, BA	Environmtl Studies/Politic Sci	030103
P-CERTG-ESPT: eSports, Graduate Certificate	eSports	310504
CERTG-EXSC: Exercise Science for Clinicians, Graduate Certificate	Exercise Science	310505
MS-EXSC-PAPH: Exercise Science with Concentration in Physical Activity and Public Health, MS	Exercise Science	310505
MS-EXSC-O: Exercise Science, MS—Online	Exercise Science	310505
CERTG-EXPD: Experience Design, Graduate Certificate	Experience Design	110105
MFA-EXPD: Experience Design, MFA	Experience Design	110105
MS-EXPD: Experience Design, MS	Experience Design	110105
CERTG-EPHD: Experiential PhD Leadership, Graduate Certificate	Experiential PhD Leadership	520210

P-CERTG-EXTL: Experiential Teaching and Learning, Graduate Certificate	Experiential Teach and Learn	130301
CERTG-EBIO: Experimental Biotechnology, Graduate Certificate	Experimental Biotechnology	261201
MS-EXRL: Extended Realities, MS	Extended Realities	110105
CERTG-EXMD: Extreme Medicine, Graduate Certificate	Extreme Medicine	519999
MSF-FINA: Finance, MSF	Finance	520801
MSF-FINA-E: Finance, MSF—Evening / Part-Time Program	Finance	520801
MSF-FINA-O: Finance, MSF—Online	Finance	520801
P-BS-FIAM: Finance and Accounting Management, BS	Finance and Accounting Mgmt	520801
MSFMBA-E: Finance and Business Administration, MSFMBA—Part-Time	Finance/Business Admin	520801
MSFMBA-FIBA: Finance and Business Administration, MSFMBA	Finance/Business Admin	520801
MSFMBA-O: Finance and Business Administration, MSFMBA—Online	Finance/Business Admin	520801
P-CERTG-FIMI: Financial Markets and Institutions, Graduate Certificate	Financial Mkts and Inst	520899
: Management, MS with Major in Fintech Management	Fintech Management	307104
P-CERTG-FACC: Forensic Accounting, Graduate Certificate	Forensic Accounting	430406
P-CERTG-FDDV: Fundraising and Development, Graduate Certificate	Fundraising and Development	520206
BFA-GAAN: Game Art and Animation, BFA	Game Art and Animation	500605
BFA-GAME: Game Design, BFA	Game Design	100304
P-CERTG-GMDS: Game Design, Graduate Certificate	Game Design	100304
BS-GDMT: Game Design and Music with Concentration in Music Technology, BS	Game Design/Music	100304
CERTG-GMED: Game Experience Design, Graduate Certificate	Game Experience Design	100304
CERTG-GMSC: Game Science, Graduate Certificate	Game Science	100304
MS-GSAD: Game Science and Design, MS	Game Science and Design	100304
P-CERTG-GINT: Geographic Information Systems, Graduate Certificate	Geographic Information Tech	110103
BA-GLAS: Global Asian Studies, BA	Global Asian Studies	050103
CERTG-GLDR: Global Doctoral Research, Graduate Certificate	Global Doctoral Research	302001
P-CERTG-GSIR: Global Studies and International Relations, Graduate Certificate	Global Stu and Intl Relations	302001
P-MS-GSIR: Global Studies and International Relations, MS	Global Stu and Intl Relations	302001
BS-GIDM: Graphic and Information Design and Mathematics, BS	Graphic and Info. Design/Math	500499
CERTG-HIME: Health Informatics Management and Exchange, Graduate Certificate	Health Info Mgmt Exchange	512706
CERTG-HISP: Health Informatics Privacy and Security, Graduate Certificate	Health Info Privacy Secu	512706
CERTG-HISE: Health Informatics Software Engineering, Graduate Certificate	Health Info Software Eng	512706
MS-HEIN: Health Informatics, MS	Health Informatics	512706
CERTG-HLAW: Health Law, Graduate Certificate	Health Law	220208

CERTG-HLAP: Health Law and Policy, Graduate Certificate	Health Law and Policy	220208
P-BS-HLMG: Health Management, BS	Health Management	510799
P-CERTG-HLMG: Health Management, Graduate Certificate	Health Management	510799
BS-HLSC: Health Science, BS	Health Science	510799
P-BS-HLSC: Health Science, BS	Health Science	510799
BS-HSLW: Health Science and Law, BS	Health Science and Law	440503
BS-HSBA: Health Science and Business Administration, BS	Health Science/Business Admin	510799
BS-HLCM: Health Science and Communication Studies, BS	Health Science/Comm Studies	510799
BS-HSPS: Health Science and Psychology, BS	Health Science/Psychology	510799
BS-HSSO: Health Science and Sociology, BS	Health Science/Sociology	510799
BS-HSSP: Health Science and Spanish, BS	Health Science/Spanish	510799
P-BS-HCAD: Healthcare Administration, BS	Healthcare Administration	510701
P-CERTU-HCAD: Healthcare Administration, Undergraduate Certificate	Healthcare Administration	510701
CERTG-CLAW: Healthcare Compliance, Graduate Certificate	Healthcare Compliance	220208
DMSC-HCLD: Healthcare Leadership, DMSc	Healthcare Leadership	510701
P-CERTG-HEDA: Higher Education Administration, Higher Education Admin Graduate Certificate		130406
P-MED-HEDA: Higher Education Administration, MEd	Higher Education Admin	130406
BA-HIST: History, BA	History	540101
BS-HIST: History, BS	History	540101
MA-HIST: History, MA	History	540101
PHD-HIST: History, PhD	History	540101
PHD-HIST-A: History, PhD—Advanced Entry	History	540101
BA-HICL: History, Culture, and Law, BA	History, Culture, and Law	220000
BA-HIAS: History and Asian Studies, BA	History/Asian Studies	540101
BA-HICJ: History and Criminal Justice, BA	History/Criminal Justice	540101
BA-HICA: History and Cultural Anthropology, BA	History/Cultural Anthropol	540101
BA-HIEC: History and Economics, BA	History/Economics	540101
BS-HIEC: History and Economics, BS	History/Economics	540101
BA-HIEN: History and English, BA	History/English	540101
BA-HIPH: History and Philosophy, BA	History/Philosophy	540101
BA-HIPS: History and Political Science, BA	History/Political Science	540101
BA-HIRS: History and Religious Studies, BA	History/Religious Studies	540101
BS-HHHS: Health Humanities and Health Science, BS	Hlth Humanities/Hlth Science	513204
BA-HHHPH: Health Humanities and Public Health, BA	Hlth Humanities/Public Hlth	513204
PHD-HBSS: Human Behavior and Sustainability Sciences, PhD	Human Behavior and Sustain Sci	300601
MS-HUFA: Human Factors, MS	Human Factors	142701
MS-HMRS: Human Movement and Rehabilitation Sciences, MS	Human Movement Rehab Science	512314
MS-HMRS-EX: Human Movement and Rehabilitation Sciences, MS—Experiential	Human Movement Rehab Science	512314
PHD-HMRS: Human Movement and Rehabilitation Sciences, PhD	Human Movement Rehab Science	512314
PHD-HMRS-A: Human Movement and Rehabilitation Sciences, PhD—Advanced Entry	Human Movement Rehab Science	512314

CERTG-HURL: Human Resources Law, Graduate Certificate	Human Resources Law	220299
P-CERTG-HRMG: Human Resources Management, Graduate Certificate	Human Resources Management	521001
P-MS-HRMG: Human Resources Management, MS	Human Resources Management	521001
CERTG-HMRL: Human Rights Law, Graduate Certificate	Human Rights Law	220209
BA-HSVC: Human Services, BA	Human Services	440000
BS-HSVC: Human Services, BS	Human Services	440000
P-BS-HSVC: Human Services, BS	Human Services	440000
P-MS-HSVC: Human Services, MS	Human Services	440000
BA-HSCM: Human Services and Communication Studies, BA	Human Services/Comm Studies	440000
BS-HSCJ: Human Services and Criminal Justice, BS	Human Services/Crim Justice	430199
BA-HSIA: Human Services and International Affairs, BA	Human Services/Intl Affairs	440000
BS-HUPS: Human Services and Psychology, BS	Human Services/Psychology	440000
BA-HUSO: Human Services and Sociology, BA	Human Services/Sociology	449999
BS-HUSO: Human Services and Sociology, BS	Human Services/Sociology	449999
P-CERTG-HUIN: Human-Centered Informatics, Graduate Certificate	Human-Centered Informatics	110104
CERTG-ICSE: Inclusive Computer Science Education, Graduate Certificate	Inclusive Computer Sci Educ	131321
BSIE-INDE: Industrial Engineering, BSIE	Industrial Engineering	143501
MSIE-INDE: Industrial Engineering, MSIE	Industrial Engineering	143501
PHD-INDE: Industrial Engineering, PhD	Industrial Engineering	143501
PHD-INDE-A: Industrial Engineering, PhD—Advanced Entry	Industrial Engineering	143501
BSIE-IEBA: Industrial Engineering and Business Administration, BSIE	Industrial Engr/Business Admin	143501
BSIE-IECS: Industrial Engineering and Computer Science, BSIE	Industrial Engr/Computer Sci	143501
CERTG-IDEV: Information Design and Visualization, Graduate Certificate	Info Design and Visualization	500401
MFA-IDDV: Information Design and Data Visualization, MFA	Info Dsgn Data Visualization	303101
MS-IDDV: Information Design and Data Visualization, MS	Info Dsgn Data Visualization	303101
P-CERTG-INSM: Information Security Management, Graduate Certificate	Info Security Management	439999
P-MPS-INFN: Informatics, MPS	Informatics	110104
CERTG-INET: Information Ethics, Graduate Certificate	Information Ethics	380104
MSIS-INSY: Information Systems, MSIS	Information Systems	140903
MSIS-INSY-B: Information Systems, MSIS—Bridge	Information Systems	140903
MSIS-INSY-O: Information Systems, MSIS—Online	Information Systems	140903
MSIS-IS-B-O: Information Systems, MSIS—Bridge	Information Systems	140903
—Online		
P-BS-INFN: Information Technology, BS	Information Technology	110103
P-CERTG-IAMG: Insurance Analytics and Management, Graduate Certificate	Insurance Analytics and Mgmt	521701
P-MPS-IAMG: Insurance Analytics and Management, MPS	Insurance Analytics and Mgmt	521701
P-CERTG-INHW: Integrative Health and Wellness, Graduate Certificate	Integrative Health Wellness	510001

CERTG-PLAW: Intellectual Property Law, Graduate Intellectual Property Law Certificate		220212
P-CERTG-INDS: Interactive Design, Graduate Certificate	Interactive Design	110801
PHD-INTY: Interdisciplinary, PhD	Interdisciplinary	300000
PHD-INTY-A: Interdisciplinary, PhD—Advanced Entry	Interdisciplinary	300000
PHD-IDSM: Interdisciplinary Design and Media, PhD	Interdisciplinary Dsgn Media	500401
PHD-IDSM-A: Interdisciplinary Design and Media, PhD—Advanced Entry	Interdisciplinary Dsgn Media	500401
PHD-INTE: Interdisciplinary Engineering, PhD	Interdisciplinary Engineering	140101
PHD-INTE-A: Interdisciplinary Engineering, PhD—Advanced Entry	Interdisciplinary Engineering	140101
BS-INST: Interdisciplinary Studies, BS	Interdisciplinary Studies	240101
P-BS-INST: Interdisciplinary Studies, BS	Interdisciplinary Studies	240101
BA-INAF: International Affairs with African Studies Concentration, BA	International Affairs	450901
BA-INAF: International Affairs with Asian Studies Concentration, BA	International Affairs	450901
BA-INAF: International Affairs with European Studies Concentration, BA	International Affairs	450901
BA-INAF: International Affairs with Latin American Studies Concentration, BA	International Affairs	450901
BA-INAF: International Affairs with Middle East Studies Concentration, BA	International Affairs	450901
BA-INAF: International Affairs, BA	International Affairs	450901
MA-INAF: International Affairs, MA	International Affairs	450901
BA-IAHI: International Affairs and History, BA	International Affairs/History	450901
BSIB-INBU-NX: International Business, BSIB	International Business	521101
BSIB-INBU-X: International Business, BSIB	International Business	521101
CERTG-INBU: International Business, Graduate Certificate	International Business	521101
CERTG-INBU-O: International Business, Graduate Certificate—Online	International Business	521101
MSIB-INBU: International Business, MSIB	International Business	521101
MS-INMA: International Management, MS	International Management	520101
MS-INOT: Internet of Things, MS	Internet of Things	140999
BA-IARS: International Affairs and Religious Studies, BA	Intl Affairs/Religious Stu	450901
BA-IACJ: International Affairs and Criminal Justice, BA	Intl Affairs/Criminal Justice	450901
BA-IACA: International Affairs and Cultural Anthropology, BA	Intl Affairs/Cultural Anthro	450901
BA-IAEC: International Affairs and Economics, BA	Intl Affairs/Economics	450604
BS-IAIB: International Affairs and International Business, BS	Intl Affairs/Intl Business	450901
CERTG-INV: Investments, Graduate Certificate	Investments	520807
CERTG-TIPS: IP Telephony Systems, Graduate Certificate	IP/Telephony Systems	110901
BA-JESR: Jewish Studies and Religion, BA	Jewish Studies/Religion	380206
BA-JOUR: Journalism, BA	Journalism	090401
MA-JOUR: Journalism, MA	Journalism	090401
BA-JOCM: Journalism and Communication Studies, BA	Journalism/Comm Studies	090401
BA-JOCA: Journalism and Cultural Anthropology, BA	Journalism/Cultural Anthro	090401

BS-JODE: Journalism and Design, BS	Journalism/Design	090401
BA-JOEN: Journalism and English, BA	Journalism/English	090401
BS-JIID: Journalism and Interaction Design, BS	Journalism/Interaction Design	090401
BA-JOIA: Journalism and International Affairs, BA	Journalism/Intl Affairs	090401
BA-JOPO: Journalism and Political Science, BA	Journalism/Political Science	090401
BA-JOSO: Journalism and Sociology, BA	Journalism/Sociology	090401
BLA-LARC: Landscape Architecture, BLA	Landscape Architecture	040601
JD-LAW: Law, JD	Law	220101
JD-LAW-P: Law, JD—Part-Time Program	Law	220101
LLM-LAW: Law, LLM—Experiential	Law	220101
LLM-LAW-O: Law, LLM—Online	Law	220101
LLM-LAW-T: Law, LLM	Law	220101
P-DLP-LAPO: Law And Policy, DLP	Law and Policy	229999
P-BS-LEAD: Leadership, BS	Leadership	520213
P-CERTG-LEAD: Leadership, Graduate Certificate	Leadership	520213
P-CERTU-LEAD: Leadership, Undergraduate Certificate	Leadership	520213
P-MS-LEAD: Leadership, MS	Leadership	520213
CERTG-LEPO: Leading People and Organizations, Graduate Certificate	Leading People Organizations	521099
P-CERTG-PMTE: Leading and Managing Technical Projects, Graduate Certificate	Leadng Managng Tech Projects	520211
CERTG-LEAN: Lean Six Sigma, Graduate Certificate	Lean Six Sigma	140101
P-CERTG-LXDT: Learning Experience Design and Technology, Graduate Certificate	Learning Exp Design Tech	130501
P-MPS-LXDT: Learning Experience Design and Technology, MPS	Learning Exp Design Tech	130501
CERTG-LEDS: Legal Design, Graduate Certificate	Legal Design	220299
MLS-LEGS: Legal Studies, MLS—Online	Legal Studies	229999
BS-LING: Linguistics, BS	Linguistics	160102
BA-LICS: Linguistics and Communication Studies, BA	Linguistics/Comm Studies	160102
BS-LICA: Linguistics and Cultural Anthropology, BS	Linguistics/Cultural Anthro	450204
BA-LIEN: Linguistics and English, BA	Linguistics/English	160102
BS-LIPS: Linguistics and Psychology, BS	Linguistics/Psychology	160102
BS-LISL: Linguistics and Speech-Language Pathology and Audiology, BS	Linguistics/Speech-Lng Pth Aud	160102
MS-MGMT: Management, MS	Management	520201
P-BS-MGMT: Management, BS	Management	520201
CERTG-MQOB: Manufacturing and Quality Operations in Biotechnology, Graduate Certificate	Manuf Qual Oper in Biotech	512010
MS-MRES: Marine and Environmental Sciences, MS	Marine Environment Sciences	030104
PHD-MRES: Marine and Environmental Sciences, PhD	Marine Environment Sciences	030104
PHD-MRES-A: Marine and Environmental Sciences, PhD—Advanced Entry	Marine Environment Sciences	030104
BS-MARB: Marine Biology, BS	Marine Biology	261302
BS-MARB3: Marine Biology, BS with Three Seas	Marine Biology	261302
MS-MARB: Marine Biology, MS	Marine Biology	261302
CERTG-MKTG: Marketing, Graduate Certificate	Marketing	521401
CERTG-MKTG-O: Marketing, Graduate Certificate—Online	Marketing	521401

CERTG-MKAN: Marketing Analytics, Graduate Certificate	Marketing Analytics	521402
BA-MATH: Mathematics, BA	Mathematics	270101
BS-MATH: Mathematics, BS	Mathematics	270101
MS-MATH: Mathematics, MS	Mathematics	270101
PHD-MATH: Mathematics, PhD	Mathematics	270101
PHD-MATH-A: Mathematics, PhD—Advanced Entry	Mathematics	270101
BS-MABA: Mathematics and Business Administration, BS	Mathematics/Business Admin	270101
BS-MAPL: Mathematics and Philosophy, BS	Mathematics/Philosophy	270101
BS-MAPH: Mathematics and Physics, BS	Mathematics/Physics	270101
BS-MAPO: Mathematics and Political Science, BS	Mathematics/Political Science	270101
BS-MAPY: Mathematics and Psychology, BS	Mathematics/Psychology	270101
BS-MASO: Mathematics and Sociology, BS	Mathematics/Sociology	270101
BSME-MECE: Mechanical Engineering, BSME	Mechanical Engineering	141901
MSME-MECE: Mechanical Engineering with Concentration in General Mechanical Engineering, MSME	Mechanical Engineering	141901
MSME-MECE: Mechanical Engineering with Concentration in Materials Science, MSME	Mechanical Engineering	141901
MSME-MECE: Mechanical Engineering with Concentration in Mechanics and Design, MSME	Mechanical Engineering	141901
MSME-MECE: Mechanical Engineering with Concentration in Mechatronics, MSME	Mechanical Engineering	141901
MSME-MECE: Mechanical Engineering with Concentration in Thermofluids, MSME	Mechanical Engineering	141901
PHD-MECE: Mechanical Engineering, PhD	Mechanical Engineering	141901
PHD-MECE-A: Mechanical Engineering, PhD—Advanced Entry	Mechanical Engineering	141901
BSME-MEDS: Mechanical Engineering and Design, BSME	Mechanical Engineering/Design	141901
BSME-MEHI: Mechanical Engineering and History, BSME	Mechanical Engineering/History	141901
BSME-MEPH: Mechanical Engineering and Physics, BSME	Mechanical Engineering/Physics	141901
BSME-MEBE: Mechanical Engineering and Bioengineering, BSME	Mechanical Engr/Bioengineering	141901
BSME-MECS: Mechanical Engineering and Computer Science, BSME	Mechanical Engr/Computer Sci	141901
P-BS-MTRO: Mechatronics, BS	Mechatronics	144201
BA-MSPH: Media and Screen Studies and Philosophy, BA	Media Screen Stud/Philosophy	090199
BA-MSHI: Media and Screen Studies and History, BA	Media Screen Studies/History	090199
MS-MEDA: Media Advocacy, MS	Media Advocacy	099999
BA-MSST: Media and Screen Studies, BA	Media and Screen Studies	090199
BFA-MART: Media Arts, BFA	Media Arts	500102
BA-MACM: Media Arts and Communication Studies, BA	Media Arts/Comm Studies	500102
MS-MIDC: Media Innovation and Data Communication, MS	Media Innovation and Data Comm	090702
BA-MSJO: Media and Screen Studies and Journalism, BA	Media Screen Stu/Journalism	090199
BA-MSPO: Media and Screen Studies and Political Science, BA	Media Screen Stu/Political Sci	090199

BA-MSSO: Media and Screen Studies and Sociology, BA	Media Screen Stu/Sociology	090199
BA-MSTH: Media and Screen Studies and Theatre, BA	Media Screen Stu/Theatre	090199
BS-MSTH: Media and Screen Studies and Theatre, BS	Media Screen Stu/Theatre	090199
BA-MSMA: Media and Screen Studies and Media Arts, BA	Media Screen Stud./Media Arts	090199
BA-MSEN: Media and Screen Studies and English, BA	Media Screen Studies/English	090199
P-CERTG-MDRA: Medical Device Regulatory Affairs, Graduate Certificate	Medical Device Regulatory Aff.	512799
MS-MCDD: Medicinal Chemistry Drug Discovery, MS	Medicinal Chem Drug Discov	512004
PHD-MCDD: Medicinal Chemistry and Drug Discovery, PhD	Medicinal Chem Drug Discov	512004
PHD-MCDD-A: Medicinal Chemistry and Drug Discovery, PhD—Advanced Entry	Medicinal Chem Drug Discov	512004
CERTG-MOBI: Molecular Biotechnology, Graduate Certificate	Molecular Biotechnology	261201
MA-MSED: Multiple Subject Education, MA	Multiple Subject Education	131202
BA-MUSI: Music, BA	Music	500901
BS-MUSI-MUID: Music with Concentration in Music Industry, BS	Music	500901
BS-MUSI-MUTE: Music with Concentration in Music Technology, BS	Music	500901
BS-MUCM: Music and Communication Studies with Concentration in Music Industry, BS	Music/Communication Studies	500901
CERTG-MFMG: Mutual Fund Management, Graduate Certificate	Mutual Fund Management	520807
CERTG-NNMD: Nanomedicine, Graduate Certificate	Nanomedicine	300101
MS-NNMD: Nanomedicine, MS	Nanomedicine	300101
MS-NETS: Network Science, MS	Network Science	300601
PHD-NETS: Network Science, PhD (BV, CS, SC, SH)	Network Science	300601
P-CERTG-NCBR: Nonclinical Biomedical Product Regulation, Graduate Certificate	Nonclinical Biomed Product Reg	512002
CERTG-NPSC: Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate	Nonprof-Philanth-Social Change	520206
P-CERTG-NPMG: Nonprofit Management, Graduate Certificate	Nonprofit Management	520206
P-MS-NPMG: Nonprofit Management, MS	Nonprofit Management	520206
DNP-NUAN: Nurse Anesthesia, DNP	Nurse Anesthesia	513804
BSN-NURS: Nursing, BSN	Nursing	513801
BSN-NURS-2: Nursing, BSN—Accelerated Program for Second-Degree Students	Nursing	513801
BSN-NURS-RN: Nursing, RN-to-BSN	Nursing	513801
BSN-NURS-T: Nursing, BSN—Transfer Track	Nursing	513801
CAGS-CCAC: Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, CAGS	Nursing	513801
CAGS-CCNN: Nursing—Neonatal Nurse Practitioner, CAGS	Nursing	513801
CAGS-NUAN: Nurse Anesthesia, CAGS	Nursing	513801
CAGS-PCAN: Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, CAGS	Nursing	513801

CAGS-PEAC: Nursing—Pediatric Nurse Practitioner, Acute Care, CAGS	Nursing	513801
CAGS-PEPA: Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, CAGS	Nursing	513801
CAGS-PEPC: Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS	Nursing	513801
CAGS-PSMH: Nursing—Psychiatric-Mental Health Nursing Nurse Practitioner, CAGS		513801
DNP-CRNA: Nursing Practice with Concentration in Nurse Anesthesia, DNP	Nursing	513801
DNP-NURS: Nursing, DNP (Post-Master's)	Nursing	513801
DNP-NURS-BSE: Nursing, DNP	Nursing	513801
MS-CCAC: Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, MS	Nursing	513801
MS-CCNN: Nursing—Neonatal Nurse Practitioner, MS	Nursing	513801
MS-NUAD: Nursing Administration, MS	Nursing	513801
MS-NUAN: Nursing Anesthesia, MS	Nursing	513801
MS-NURS: Nursing, MS	Nursing	513801
MS-NURS-DE: Nursing, MS—Direct Entry	Nursing	513801
MS-PCAN: Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, MS	Nursing	513801
MS-PCFN: Nursing—Family Nurse Practitioner, Primary Care, MS	Nursing	513801
MS-PEPA: Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, MS	Nursing	513801
MS-PEPC: Nursing—Pediatric Nurse Practitioner, Primary Care, MS	Nursing	513801
MS-PSMH: Nursing—Psychiatric-Mental Health Nurse Practitioner, MS	Nursing	513801
PHD-NURS: Nursing, PhD	Nursing	513801
PHD-NURS-MSE: Nursing, PhD—Advanced Entry (Post-MSN)	Nursing	513801
MS-NULD: Nursing Leadership, MS	Nursing Leadership	513802
CERTG-OMIC: Omics, Graduate Certificate	Omics	261103
MSOR-OPRE: Operations Research, MSOR	Operations Research	143701
MSOR-OPRE-AS: Operations Research, MSOR	Operations Research	143701
P-CERTG-ORG: Organizational Communication, Graduate Certificate	Organizational Communication	090101
P-MS-ORLD: Organizational Leadership, MS	Organizational Leadership	520213
CERTG-PTSF: Patient Safety, Graduate Certificate	Patient Safety	512213
CERTG-PEAC: Pediatric Nurse Practitioner, Acute Care, Graduate Certificate	Pediatric Acute Care PNP	513814
BS-PFER: Performance and Extended Realities, BS	Performance and Ext Realities	100304
PHD-PHEI: Personal Health Informatics, PhD	Personal Health Informatics	512706
MS-PHEN: Pharmaceutical Engineering, MS	Pharmaceutical Engineering	140702
BS-PHSC: Pharmaceutical Sciences, BS	Pharmaceutical Sciences	512010
MS-PHSC: Pharmaceutical Sciences, MS	Pharmaceutical Sciences	512010
PHD-PHSC: Pharmaceutical Sciences, PhD	Pharmaceutical Sciences	512010
PHD-PHSC-A: Pharmaceutical Sciences, PhD—Advanced Entry	Pharmaceutical Sciences	512010
CERTG-PHTE: Pharmaceutical Technologies, Graduate Certificate	Pharmaceutical Technologies	261201
MS-PHDD: Pharmaceutics and Drug Delivery, MS	Pharmaceutics Drug Delivery	512010

PHD-PHDD: Pharmaceutics and Drug Delivery, PhD	Pharmaceutics Drug Delivery	512010
PHD-PHDD-A: Pharmaceutics and Drug Delivery, PhD—Advanced Entry	Pharmaceutics Drug Delivery	512010
MS-PHAC: Pharmacology, MS	Pharmacology	261001
PHD-PHAC: Pharmacology, PhD	Pharmacology	261001
PHD-PHAC-A: Pharmacology, PhD—Advanced Entry	Pharmacology	261001
PHARMD-G: Pharmacy, PharmD	Pharmacy	512001
PHARMD-G-DE: Pharmacy, PharmD—Direct Entry	Pharmacy	512001
PHARMD-U: Pharmacy, PharmD	Pharmacy	512001
BS-PHST: Pharmacy Studies, BS	Pharmacy Studies	512001
PHARMD-U: Pharmacy Studies, BS	Pharmacy Studies	512001
BA-PHIL: Philosophy, BA	Philosophy	380101
BS-PHIL: Philosophy, BS	Philosophy	380101
DPT-PHTH-DE: Physical Therapy, DPT—Postbaccalaureate Entry	Physical Therapy	512308
DPT-PHTH-G: Physical Therapy, DPT—Graduate	Physical Therapy	512308
DPT-PHTH-U: Physical Therapy, DPT - Undergraduate	Physical Therapy	512308
P-DPT-PHTH-DE: Transitional Doctor of Physical Therapy, DPT—Direct Entry	Physical Therapy	512308
P-DPT-PHTH: Transitional Doctor of Physical Therapy, DPT	Physical Therapy	512308
MS-PHAS: Physician Assistant, MS	Physician Assistant	510912
BS-PHYS: Physics, BS	Physics	400801
MS-PHYS: Physics, MS	Physics	400801
PHD-PHYS: Physics, PhD	Physics	400801
PHD-PHYS-A: Physics, PhD—Advanced Entry	Physics	400801
BS-PHMU: Physics and Music with Concentration in Music Technology, BS	Physics/Music	400801
BS-PHPH: Physics and Philosophy, BS	Physics/Philosophy	400801
BA-POLI: Political Science, BA	Political Science	451001
BS-POLI: Political Science, BS	Political Science	451001
MA-POLI: Political Science, MA	Political Science	451001
P-BS-POLI: Political Science, BS	Political Science	451001
PHD-POLI: Political Science, PhD	Political Science	451001
PHD-POLI-A: Political Science, PhD—Advanced Entry	Political Science	451001
BS-POBA: Political Science and Business Administration, BS	Political Science/Business Adm	451001
BA-POCM: Political Science and Communication Studies, BA	Political Science/Comm Studies	451001
BS-POCM: Political Science and Communication Studies, BS	Political Science/Comm Studies	451001
BA-POEC: Political Science and Economics, BA	Political Science/Economics	451001
BS-POEC: Political Science and Economics, BS	Political Science/Economics	450603
BA-POHS: Political Science and Human Services, BA	Political Science/HumanService	451001
BS-POHS: Political Science and Human Services, BS	Political Science/HumanService	451001
BA-POIA: Political Science and International Affairs, BA	Political Science/Intl Affairs	451001
BA-POPL: Political Science and Philosophy, BA	Political Science/Philosophy	451001
BS-POPL: Political Science and Philosophy, BS	Political Science/Philosophy	451001

BS-PPBA: Politics, Philosophy, and Economics and Business Administration, BS	Politics, Phil Econ/Bus Adm	451099
BS-PSPE: Politics, Philosophy, and Economics, BS	Politics, Philosophy, and Econ	451099
MS-POHE: Population Health, MS	Population Health	512299
PHD-POHE: Population Health, PhD	Population Health	512299
PHD-POHE-A: Population Health, PhD—Advanced Entry	Population Health	512299
CERTG-PSTE: Postsecondary Teaching, Graduate Certificate	Postsecondary Teaching	131214
CERTG-PLEJ: Poverty Law and Economic Justice, Graduate Certificate	Poverty Law Economic Justice	220299
P-CERTU-PMED: Premedical Studies, Postbaccalaureate Undergraduate Certificate	Pre-Medical Studies	511102
CERTG-PCFN: Primary Care Nursing FNP, Graduate Certificate	Primary Care Nursing FNP	513805
P-CERTU-PRMA: Principles of Manufacturing, Undergraduate Certificate	Principles of Manufacturing	150613
CERTG-PRVL: Privacy Law, Graduate Certificate	Privacy Law	220299
CERTG-PSEN: Process Safety Engineering, Graduate Certificate	Process Safety Engineering	140799
CERTG-PRSC: Process Science, Graduate Certificate	Process Science	261201
MS-PRDV: Product Development, MS	Product Development	142701
MSAMBA-PRAC: Accounting and Business Administration, MSAMBA	Professional Accounting	520301
P-CERTG-PSAD: Professional Sports Administration, Graduate Certificate	Professional Sports Administra	310504
P-CERTG-PBUA: Project Business Analysis, Graduate Certificate	Project Business Analysis	521302
P-BS-PMGT: Project Management, BS	Project Management	521301
P-CERTG-PMGT: Project Management, Graduate Certificate	Project Management	521301
P-CERTU-PMGT: Project Management, Undergraduate Certificate	Project Management	521301
P-MS-PMGT: Project Management, MS	Project Management	521301
BS-PSYC: Psychology, BS	Psychology	422799
MS-PSYC: Psychology, MS	Psychology	422799
P-BS-PSYC: Psychology, BS	Psychology	422799
PHD-PSYC: Psychology, PhD	Psychology	422799
PHD-PSYC-A: Psychology, PhD—Advanced Entry	Psychology	422799
BS-PSDE: Psychology and Design, BS	Psychology/Design	422799
BS-PSMU: Psychology and Music, BS	Psychology/Music	422799
BS-PSTH: Psychology and Theatre, BS	Psychology/Theatre	422799
MPA-PUAD: Public Administration, MPA	Public Administration	440401
P-CERTG-PUMR: Public and Media Relations, Graduate Certificate	Public and Media Relations	090102
BA-PUHE: Public Health, BA	Public Health	512201
MPH-PUHE: Public Health, MPH	Public Health	512201
MPH-PUHE-EX: Public Health, MPH—Accelerated	Public Health	512201
BA-PHLW: Public Health and Law, BA	Public Health and Law	440503
BA-PHCM: Public Health and Communication Studies, BA	Public Health/Comm Studies	512201
BA-PHCA: Public Health and Cultural Anthropology, BA	Public Health/Cultural Anthro	512201
BA-PHJO: Public Health and Journalism, BA	Public Health/Journalism	512201

BA-PHSO: Public Health and Sociology, BA	Public Health/Sociology	512201
CERTG-PUHI: Public History, Graduate Certificate	Public History	540105
MPP-PUPL: Public Policy, MPP	Public Policy	440401
PHD-PUPL: Public Policy, PhD	Public Policy	440401
PHD-PUPL-A: Public Policy, PhD—Advanced Entry	Public Policy	440401
CERTG-PUPA: Public Policy Analysis, Graduate Certificate	Public Policy Analysis	440501
BA-PUBR: Public Relations, BA	Public Relations	090902
P-CERTG-QASC: Quality Assurance Compliance, Graduate Certificate	Quality Assurance Compliance	510720
MSFMBA-QFBA: Quantitative Finance and Business Administration, MSFMBA	Quant Finance/Business Admin	270305
MSF-QFIN: Quantitative Finance, MSF	Quantitative Finance	270305
P-MS-REAF: Regulatory Affairs, MS	Regulatory Affairs	512009
BA-REST: Religious Studies, BA	Religious Studies	380201
BA-RSAS: Religious Studies and Africana Studies, Religious Studies/Africana St. BA	Religious Studies	380201
P-CERTG-RESE: Remote Sensing, Graduate Certificate	Remote Sensing	450799
CERTG-ERES: Renewable Energy, Graduate Certificate	Renewable Energy	142701
MS-RESS: Resilience Studies, MS	Resilience Studies	450999
MS-ROBO: Robotics, MS	Robotics	144201
MS-ROBO-CSCI: Robotics with Concentration in Computer Science, MS	Robotics	144201
MS-ROBO-ELCE: Robotics with Concentration in Electrical and Computer Engineering, MS	Robotics	144201
MS-ROBO-MECE: Robotics with Concentration in Mechanical Engineering, MS	Robotics	144201
MS-RWEH: Real-World Evidence in Healthcare and Life Sciences, MS	RWE in Healthcare and Life Sci	300601
P-CERTG-SMGT: Sales Management, Graduate Certificate	Sales Management	521804
CAGS-SCPS: School Psychology, CAGS	School Psychology	422805
PHD-SCPS-BSE: School Psychology, PhD	School Psychology	422805
PHD-SCPS-MSE: School Psychology, PhD—Advanced Entry	School Psychology	422805
P-MAT-SCED: Secondary Education, MAT	Secondary Education	131205
CERTG-SERE: Security and Resilience Studies, Graduate Certificate	Security Resilience Studies	450999
MS-SERE: Security and Resilience Studies, MS	Security Resilience Studies	450999
MS-SERE-EX: Security and Resilience Studies, MS—Experiential	Security Resilience Studies	450999
P-MA-SCIS: Security and Intelligence Studies, MA	Security and Intelligence Stud	430399
MS-SCEN: Semiconductor Engineering, MS	Semiconductor Engineering	151601
MA-SSED: Single Subject Education, MA	Single Subject Education	131205
P-CERTG-SMOP: Social Media for Organizational Performance, Graduate Certificate	Social Media for Org Perform	090101
BA-SOCI: Sociology, BA	Sociology	451101
BS-SOCI: Sociology, BS	Sociology	451101
MA-SOCI: Sociology, MA	Sociology	451101
PHD-SOCI: Sociology, PhD	Sociology	451101
PHD-SOCI-A: Sociology, PhD—Advanced Entry	Sociology	451101
BA-SOCA: Sociology and Cultural Anthropology, BA	Sociology/Cultural Anthropol	451101

BS-SOCA: Sociology and Cultural Anthropology, BS	Sociology/Cultural Anthropol	451101
BA-SOES: Sociology and Environmental Studies, BA	Sociology/Envr. Studies	451101
BA-SOIA: Sociology and International Affairs, BA	Sociology/Intl Affairs	451101
BA-SOPH: Sociology and Philosophy, BA	Sociology/Philosophy	451101
BA-SOPO: Sociology and Political Science, BA	Sociology/Political Science	459999
BA-SORL: Sociology and Religious Studies, BA	Sociology/Religious Studies	451101
CERTG-SWES: Software Engineering Systems, Graduate Certificate	Software Engineering Systems	140903
MS-SWES: Software Engineering Systems, MS	Software Engineering Systems	140903
BA-SPAN: Spanish, BA	Spanish	160905
BA-SPIA: Spanish and International Affairs, BA	Spanish/International Affairs	160905
BA-SPLI: Spanish and Linguistics, BA	Spanish/Linguistics	160905
BA-SPPH: Spanish and Public Health, BA	Spanish/Public Health	160905
BS-SLPA: Speech-Language Pathology and Audiology, BS	Speech-Lang Pathol/Audiology	510204
MS-SLPT: Speech-Language Pathology, MS	Speech-Language Pathology	510204
BS-SLBN: Speech-Language Pathology and Audiology and Behavioral Neuroscience, BS	Speech-Lng Pth Aud/Behav Neuro	510204
BS-SLHS: Speech-Language Pathology and Audiology and Human Services, BS	Speech-Lng Pth Aud/Human Serv	510204
P-MSLD-SPLE: Sports Leadership, MSLD	Sports Leadership	310504
MS-STAT: Statistics, MS	Statistics	270501
MS-STAT-C: Statistics, MS—Connect	Statistics	270501
BFA-STAR: Studio Art, BFA	Studio Art	500702
CERTG-SCEM: Supply Chain Engineering Management, Graduate Certificate	Supply Chain Engineering Mgmt	140101
CERTG-SUPC: Supply Chain Management, Graduate Certificate	Supply Chain Management	520203
CERTG-SUPC-O: Supply Chain Management, Graduate Certificate—Online	Supply Chain Management	520203
CERTG-SUCP: Sustainability and Climate Change Policy, Graduate Certificate	Sustain Climate Chnge Policy	440501
CERTG-SUBE: Sustainability and Business, Graduate Certificate	Sustainability and Business	520704
CERTG-STEN: Sustainability Engineering, Graduate Certificate	Sustainability Engineering	144801
CERTG-SUSC: Sustainability Sciences, Graduate Certificate	Sustainability Sciences	030104
MSSBS-SUBS: Sustainable Building Systems, MSSBS	Sustainable Building Systems	149999
CERTG-SESY: Sustainable Energy Systems, Graduate Certificate	Sustainable Energy Systems	142701
MDES-SUEN: Sustainable Urban Environments, MDes—Two-Year Program	Sustainable Urban Environments	040401
MDES-SUEN1: Sustainable Urban Environments, MDes—One-Year Program	Sustainable Urban Environments	040401
CERTG-TELD: Technology Leadership, Graduate Certificate	Technology Leadership	520216
MS-TNET: Telecommunication Networks, MS	Telecommunication Networks	110901
BA-THEA: Theatre, BA	Theatre	500501
BS-THEA: Theatre, BS	Theatre	500501
BA-THID: Theatre and Interaction Design, BA	Theatre/Interaction Design	500501
BS-THID: Theatre and Interaction Design, BS	Theatre/Interaction Design	500501
BA-THJO: Theatre and Journalism, BA	Theatre/Journalism	500501

CERTG-USLW: United States Law, Graduate Certificate	United States Law	220203
CERTG-URBA: Urban Analytics, Graduate Certificate	Urban Analytics	451201
MS-URBI: Urban Informatics, MS	Urban Informatics	111099
MS-URPP: Urban Planning and Policy, MS	Urban Planning and Policy	451201
CERTG-URBN: Urban Studies, Graduate Certificate	Urban Studies	451201
P-CERTG-USAB: Usability, Graduate Certificate	Usability	111004
CERTG-VCDV: Vaccine Development, Graduate Certificate	Vaccine Development	512006
MS-WNEN: Wireless and Network Engineering, MS	Wireless Network Engineering	141004
CERTG-WOST: Women's, Gender, and Sexuality Studies, Graduate Certificate	Women's Gender Sexuality Stu	050207
CERTG-W GSL: Women, Gender, Sexuality, and the Law, Graduate Certificate	Women, Gender, Sexuality Law	220299

## Resources

The following resources supplement this catalog:

- Academic Calendars (<https://registrar.northeastern.edu/group/calendar/>)
- Class Schedules ([https://service.northeastern.edu/registrar/?id=kb\\_article\\_view&sysparm\\_article=KB000019896&sys\\_kb\\_id=8cad210687d906d0878b0edc0ebb3502&spa=1](https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019896&sys_kb_id=8cad210687d906d0878b0edc0ebb3502&spa=1))
- University Events (<http://calendar.northeastern.edu/>)

## Information for Entering Students

Graduate education at Northeastern University integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities in Boston and around the world. Northeastern offers hundreds of graduate programs, ranging from doctoral and full-time master's programs to part-time programs and graduate certificates, including an array of innovative PhD and master's programs designed to prepare students for emerging new fields. Students are able to take courses on campus, online, or in hybrid formats. This multidimensional learning environment offers students the knowledge and experience to excel and the flexibility to create the educational experience that best meets their needs. Our graduates are well positioned to meet the diverse demands of careers in academia, industry, and the professions.

- Academic Resources (p. 138)
- Campus Resources (p. 139)
- Information for International Students (p. 142)
- Information Technology Services (p. 143)
- Off Campus Engagement and Support (p. 144)
- Office of the University Registrar (p. 139)

### Academic Resources

- Libraries (p. 138)
- Office of the University Registrar (p. 139)

### Libraries

#### Northeastern University Library

Website (<https://library.northeastern.edu>)  
617.373.8778

The Northeastern University Library serves the entire Northeastern community—in Boston, Oakland, across the global university system, and online. The Library provides collections and services supporting research and teaching across disciplines. Its collections are extensive, with a large proportion available digitally. The Library's collections include more than 1 million e-books; almost 500,000 print titles; more than 150,000 licensed e-journals; and more than 200,000 streaming audio and visual titles. Access to print and electronic materials is provided through Scholar OneSearch, the Library's discovery platform. The Library's Archives and Special Collections hold historical records and publications of Northeastern and unique materials preserving the history of Boston's social movements, public infrastructure, neighborhoods, and natural environments.

Services provided by the Library include both on-site (in Boston and in Oakland) and online research help, the latter including 24/7 live chat with a reference librarian; subject-specialist librarians who provide in-depth consultation and research support for each academic program at the university; and an interlibrary loan system for providing materials not readily available at Northeastern. The Library actively supports the unique needs of graduate students in research and publishing through services such as citation management workshops, research data support, and digital scholarship services.

The Snell Library building in Boston is open to all Northeastern students, faculty, and staff. Spaces in the building include areas for group work and quiet individual study, with more than 50 group study rooms with whiteboards and plug-in displays for collaborative group work. Individual study rooms are also available for graduate students. The Library supports a range of creative activities and includes studios for audio recording, video production, and 3D printing.

F. W. Olin Library in Oakland is open to all Northeastern students, faculty, and staff, as well as Mills College and Northeastern University alumni and community members. The Library offers a collection of 200,000 volumes and other media supporting the curricular needs of the programs on the Oakland campus. Spaces in the building include areas for quiet study and group work, including reservable study rooms, a seminar room, and the student lounge. F. W. Olin Library houses special collections in the Elinor Raas Heller Rare Book Room. Oakland special collections include early printed books, contemporary fine press and artists' books, the Mills College Archive, and other archives and manuscripts.

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### School of Law Library

Website (<https://law.northeastern.edu/library/>)  
617.373.3332

The School of Law Library, located on four floors in the Knowles Law Center, includes a comprehensive collection of U.S. legal materials in print and in electronic format. Of particular note is the library's collection in the areas of public interest law; international human rights law; and public health, death penalty issues, and progressive lawyering. More information can be found at the School of Law Library webpage (<https://law.northeastern.edu/library/>).

## Office of the University Registrar

The Office of the University Registrar provides an important link between the university's academic programs and policies and the student. It administers a number of specific services, including class scheduling, registration, record functions, verification of enrollment, reporting, and transcript services.

The Office of the University Registrar utilizes the Student Hub (<https://me.northeastern.edu/>) to provide students convenient access to information and services, including class schedules and registration, most recent grades, unofficial transcripts, and transcript and enrollment verification requests.

Office of the University Registrar website (<https://registrar.northeastern.edu/>)  
registrar@northeastern.edu  
617.373.2300  
617.373.5351 (fax)

### Maintenance of Student Records

The Office of the University Registrar is responsible for ensuring appropriate maintenance and safekeeping of student records. The transcript, which is stored electronically and maintained indefinitely, is the holistic record of student attendance and degree progress. In the event that the university discontinues operations, the archive of student records would be maintained by:

Massachusetts Department of Higher Education  
One Ashburton Place  
Room 1401  
Boston, MA 02108

## Campus Resources

- Center for Advancing Teaching and Learning Through Research (p. 139)
- Disability Access Services (p. 139)
- Employer Engagement and Career Design (p. 140)
- Public Safety (p. 140)
- University Health and Counseling Services (p. 141)
- We Care (p. 142)

## Center for Advancing Teaching and Learning Through Research

catlr@northeastern.edu  
Website (<https://learning.northeastern.edu/>)  
  
617.373.3157  
617.373.7779 (fax)

The Center for Advancing Teaching and Learning Through Research provides professional development for all graduate students at Northeastern University in their roles as teaching assistants, instructors, and future faculty and professionals. We provide a range of opportunities for graduate students to develop effective teaching skills, including course design and communication. CATLR is committed to supporting your success at Northeastern and beyond, and we welcome you to:

- Participate in workshops and other events to learn about effective practices in teaching and course design and to adapt them for your own current or future use.
- Meet one-on-one with a CATLR consultant to discuss any aspect of teaching or preparing for the academic job market and postdoctoral careers, including developing course syllabi, teaching statements, teaching portfolios, and diversity statements.
- Invite a CATLR consultant to observe your class, recitation, lab, studio, or guest lecture and to meet with you afterward to share and discuss their observations in relation to your own goals and reflections.
- Learn more about our self-paced Future Faculty Program, designed for you to reflect on and prepare for the various dimensions of teaching in higher education.

All of CATLR's services are provided on a formative and confidential basis.

## Disability Access Services

617.373.2675

617.373.7800 (fax)

Website (<https://drc.sites.northeastern.edu/>)

Northeastern University and **Disability Access Services** are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act to participate fully in the activities of the university. To receive accommodations through DAS, students must provide appropriate documentation that demonstrates a current significant limitation and the corresponding need for adjustments or services. DAS evaluates the information provided by students and their clinicians on a case-by-case basis and makes an individualized determination about requested adjustments based on an informed and interactive process. Adjustments and services are available for students with the following diagnoses, among others:

- Learning disabilities and/or ADHD
- Autism spectrum disorders
- Chronic or degenerative disorders
- Hearing loss
- Mobility impairments
- Psychiatric disorders
- Traumatic or acquired brain injury
- Vision impairments

Students should provide documentation to **DAS** at their earliest convenience to allow for sufficient time for review. After the documentation has been reviewed, a disability specialist will contact the student regarding appropriate next steps. Visit the DAS website (<http://www.northeastern.edu/drc/>) for additional information or contact staff at 617.373.2675.

## Employer Engagement and Career Design

Website (<https://careers.northeastern.edu>)

103 Stearns Center

617.373.2430

[careers@northeastern.edu](mailto:careers@northeastern.edu)

Employer Engagement and Career Design serves a diverse and sustainable global network of learners, alumni, and employers, forming a powerful ecosystem that nurtures lifelong career design and partnerships by enabling learners to:

- Choose a major and explore career options that fit an individual's unique attributes
- Take advantage of experiential learning opportunities
- Make career decisions that will engage students and alumni in productive and fulfilling work
- Prepare for and conduct successful job searches
- Create meaningful and effective engagement with employers
- Contribute to meeting global and societal needs

We collaborate closely with the co-op community in all colleges and campuses across the global university while offering a dynamic framework of career design as lifelong learning with distinctive advising and programs to support learners at all stages of their journey. We are committed to supporting all learners and employer partners in eliminating biases and inequitable systems that stand in the way of achieving their goals and fostering an inclusive and just society.

## Public Safety

### Northeastern University Police Department

100 Columbus Place (Boston Administrative Offices)

617.373.3333 (EMERGENCY—police, fire, medical)

617.373.3934 (TTY emergency or nonemergency)

617.373.2121 (nonemergency regular business)

Emergency or Nonemergency for the Deaf and Hearing Impaired: Dial 711

Website (<https://nupd.northeastern.edu/>)

*Public Safety Division Administrative Offices*

617.373.2696

*Personal Safety*

617.373.2121

The Public Safety Division is committed to working with Northeastern University faculty, students, staff, and neighbors to build relationships and keep our campus thriving. Our work extends far beyond Boston, as we support learners in their academic and experiential endeavors around the world. The Public Safety Division is comprised of three sections: Police Department, Emergency Management, and International Safety.

The Northeastern University Police Department (<https://nupd.northeastern.edu/>) is a full-service and accredited police agency that comprises patrol and investigative divisions providing 24-hour service. NUPD has developed robust crime-detection and prevention strategies centered on technology and campus community engagement. Our well-trained officers are ready and willing to assist all members of our community.

A personal safety escort (<https://nupd.northeastern.edu/our-services/safety-escort-services/>) can be provided from one Boston on-campus location to another, any time of day, whenever personal safety is a concern. You'll need to provide your name, Northeastern ID number, and location. Safety escorts usually arrive in 10 to 15 minutes. A special, nighttime off-campus escort service, called the RedEye, runs from dusk to dawn to transport students to their residence within two miles from the center of the Boston campus. Every night from 5 p.m. until 6 a.m., the RedEye van will pick students up at Egan Access Road, behind Snell Library. In order to use this escort, you must book a ride in advance using the RedEye app, or you can book a ride at the RedEye dispatch center located at the Northeast Security office in the Ruggles Substation.

SafeZone (<https://nupd.northeastern.edu/safezone/>) is a mobile safety app that is unique to Northeastern. SafeZone is a smartphone app that any student or staff member can download and use for free. This app will connect you directly to the NUPD should you need our assistance or emergency support while you are on campus.

Fire egress drills in residence halls are held each semester to familiarize students with the alarm system and the evacuation routes. All building occupants must participate when a drill is held. For tips on fire safety, pick up a fire safety brochure or visit the NUPD website.

NUPD encourages you to familiarize yourself with all of the services provided by NUPD and to utilize the services and safety-related tips provided. If you see something that does not look or feel right, NUPD encourages you to say something by contacting NUPD at 617.373.2121 or Oakland Department of Public Safety at 510.430.3333 or utilizing the SafeZone app.

#### **LOST AND FOUND ([HTTPS://NUPD.NORTHEASTERN.EDU/OUR-SERVICES/LOST-AND-FOUND/](https://nupd.northeastern.edu/our-services/lost-and-found/))**

If you have lost an item on the Boston campus, call 617.373.3913. If your item has been turned in, we will contact you by telephone or email. If you have found an item of value on campus, return it to our headquarters located at 100 Columbus Place. If you suspect the item has been stolen, call the NUPD at 617.373.2121 to report the theft.

#### **UNIVERSITY EMERGENCY INFORMATION ([HTTPS://WWW.NORTHEASTERN.EDU/EMERGENCY-INFORMATION/](https://www.northeastern.edu/emergency-information/))**

617.373.2000 (snow emergencies)

617.373.3333 (police, medical, or fire emergencies)

Northeastern is committed to providing members of its community with a safe and secure place in which to live, work, and study.

The university is prepared to respond to emergencies and urgent situations that require immediate action. A trained team of police officers, EMTs, health and counseling experts, student affairs and residential life staff, and other professionals form a coordinated group that is able to manage a wide range of potential situations.

NU Alert, emergency broadcast communication messages, are sent to the email addresses and telephone numbers students, faculty, and staff have provided the university. For more information on NU Alert and Emergency Planning, visit the NUPD website (<https://nupd.northeastern.edu/safety/emergency-planning/>).

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## **Oakland Department of Public Safety Information**

Website (<https://oakland.northeastern.edu/student-resources/campus-safety/>)

Department of Public Safety, OAKLAND CPM, Room 113  
Oaklandsafety@northeastern.edu

Campus Emergency  
510.430.3333

Safety and Transportation  
510.430.5555

## **Health and Counseling**

### **24-Hour Mental Health Support**

Mental health support is available at any time from any location through Find@Northeastern for all full-time degree-seeking students. Call 877.233.9477 (U.S.), 855.229.8797 (Canada), or +1.781.457.7777 (International) to connect with a mental health clinician who is there to listen, guide, and help. In addition, through Find@Northeastern, students have access to unlimited free counseling sessions with therapists in their local area,

connection to specialized treatment providers, and free access to Headspace and SilverCloud. Learn more here (<https://uhcs.northeastern.edu/find-at-northeastern/>).

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**BOSTON**

University Health and Counseling Services (<https://uhcs.northeastern.edu/>)  
70 Forsyth Building, Suite 135, Boston MA 02115  
617.373.2772  
uhcs@northeastern.edu

University Health and Counseling Services provides medical and mental healthcare for students in Massachusetts. UHCS clinicians are board-certified and licensed practitioners who provide confidential assessment and treatment of medical and mental health concerns, as well as referrals to specialists in the local Boston area. VisitUHCS (<https://uhcs.northeastern.edu/>) for more information, including access to care, NUSHP, medical leave of absence, and timely health updates.

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**OAKLAND**

Counseling and Psychological Services (<https://oakland.northeastern.edu/student-resources/health-and-wellness/counseling-and-psychological-services/>)  
Cowell Building, Oakland, CA 94613  
510.430.2111  
oakland-counseling@northeastern.edu

Counseling and Psychological Services provides mental health support for students on the Oakland campus. Located in the Cowell Building, CAPS offers brief therapy, groups, outreach services, and referrals to supportive resources. Visit CAPS (<https://oakland.northeastern.edu/student-resources/health-and-wellness/counseling-and-psychological-services/>) for more information, including additional mental health resources available through Find@Northeastern.

Student Health Center (<https://oakland.northeastern.edu/student-resources/health-and-wellness/>)  
CPM 117, Oakland, CA 94613  
510.431.1108

The Student Health Center provides on-campus confidential healthcare to students enrolled at Mills at Northeastern University. Services offered include primary and preventive care, basic treatment for illnesses and injuries, laboratory and pharmacy services, and referrals to specialty care and imaging services. The Student Health Center is an outpatient clinic staffed by a board-certified and licensed nurse practitioner and supported by a team that includes a board-certified physician.

**We Care**

617.373.7591  
wecare@northeastern.edu ([we\\_care@northeastern.edu](mailto:wecare@northeastern.edu))

Website (<http://www.northeastern.edu/wecare/>)

The We Care Office assists students who are experiencing unexpected challenges to maintain their academic progress. The staff works with students individually to help them understand and explore their options, which may involve explaining Northeastern University policy, providing resources and referrals, and coordinating among university offices. We Care also provides guidance to faculty and staff in identifying Northeastern resources and policies to help students succeed.

**Information for International Students****Office of Global Services**

Website (<https://international.northeastern.edu/ogs/>)  
617.373.2310  
617.373.8788 (fax)

The Office of Global Services provides advice and support services to over 20,000 international students and scholars who represent approximately 147 nations.

OGS serves as a "home away from home" for all international students and offers a wide array of **programs and services** to assist international students with their cultural adjustment, academic success, and professional growth. Throughout the year, OGS hosts cocurricular events that celebrate culture and the rich diversity of the campus. These events are encouraged as a way to gain familiarity with Northeastern University in a

cross-cultural context while also facilitating the formation of friendships across cultures. OGS promotes meaningful interaction and intercultural understanding among citizens of all countries and their local peers, providing educational and cultural enrichment opportunities for all members of Northeastern. All students in the Northeastern community are welcome to participate in our events.

OGS provides **comprehensive immigration advising services** to assist international students in understanding the benefits and restrictions of being an international student, as governed by the federal immigration regulations set forth by the country of the student's study location within the Northeastern University Global Network. OGS advises students on the complexities of immigration compliance and interfaces with various government agencies.

During **international student orientation**, international students will receive an overview of the immigration compliance requirements along with information and resources to support academic success, student life, campus safety, and cultural adjustment.

During every required academic term, international students must maintain **full-time status and appropriate on-ground presence** at Northeastern to comply with federal immigration regulations. For study permit holders in Canada, full-time registration is required to maintain work and post-graduation benefits. For F-1/J-1 students in the United States, full-time status and appropriate on-ground presence is required to maintain eligibility for all associated benefits of F-1/J-1 status. Note that timely registration for full-time, on-ground courses is especially important so that international students may remain in compliance with Northeastern's reporting requirements to the federal government. Because understanding federal regulations is complex and often nuanced, international students should consult with OGS if they have questions about their individual status.

OGS—United States (<https://international.northeastern.edu/ogs/student-support/global-campuses/canada/>)

Information for international students and scholars attending Northeastern in the United States, including I-20 (F-1) or DS-2019 (J-1) issuance, visa processing, general guidelines, post-graduation benefits, orientation, events and programs, and support services. F-1 and J-1 students are encouraged to regularly review the guidelines on maintaining status (<https://international.northeastern.edu/ogs/current-students/understanding-visa-requirements/guidelines-on-maintaining-status/>).

OGS—Canada (<https://international.northeastern.edu/ogs/student-support/global-campuses/canada/>)

Information for international students attending the Northeastern program in Canada, including study permit compliance and extension, work eligibility, co-op work permit application, Post-Graduation Work Permit application, general guidelines, and support services.

Visa Immigration Compliance Team (<https://www.nulondon.ac.uk/study/international-students/visa/visasupport/>)—United Kingdom

The visa compliance team in London is committed to providing comprehensive support to international students throughout their CAS (Certificate of Acceptance for Studies) and UK student visa application processes. Their role encompasses assisting students in both pre- and postenrollment visa compliance activities.

The team also offers full support for an in-person enrollment on the first day at Northeastern University, London—which is a crucial process where the university verifies the information provided by international students and ensures their right to study in the United Kingdom. It is the university's responsibility to ensure that every international student possesses the correct visa to study in the United Kingdom. Once enrollment is successfully completed and all requested information is submitted, the visa compliance team issues a student ID card as a confirmation of the student's enrollment with Northeastern University, London.

The visa compliance team remains available throughout the student's enrollment life cycle to provide advice, guidance, and comprehensive support for any issues related to student visas. This includes addressing changes in program or any other matters related to visas or immigration until the international student graduates.

## Information Technology Services

IT Services is Northeastern University's central group that provides technology services, solutions, and support to all Northeastern students. Visit the **Connect To Tech guide** (<https://connect-to-tech.northeastern.edu/students/>) for information and key technology resources that are particularly helpful to students, including:

- Northeastern accounts
- Access to email
- Laptop recommendations and discounts
- Canvas learning management system
- Software such as Office 365 and Adobe Creative Cloud
- Frequently used websites and mobile apps

## Technology Support and IT Service Desk

Technology support is available 24/7 online or by phone and email. Walk-up support is available at the Tech Bar on the Boston and Oakland campuses. [G](#) ([https://service.northeastern.edu/tech/?id=its\\_contact\\_us](https://service.northeastern.edu/tech/?id=its_contact_us)) [IT Support >](#)

[service.northeastern.edu/tech](https://service.northeastern.edu/tech) (<https://service.northeastern.edu/tech>)

617.373.HELP [4357]

[help@northeastern.edu](mailto:help@northeastern.edu)

Visit the **Tech Service Portal** (<https://service.northeastern.edu/tech/>) to search for how-tos and FAQs, borrow a laptop or other equipment, start a live chat, and search other resources.

Occasionally, interruptions to university systems, services, and tools can happen—when they do, get updates about them through Northeastern's **IT status page** (<https://its.northeastern.edu/status/>).

## Off Campus Engagement and Support

617.373.8480

[offcampus@northeastern.edu](mailto:offcampus@northeastern.edu)

Off Campus Engagement and Support and our Network Housing team at Northeastern University provide support and education related to off-campus housing, renters' rights information, and campus and community connection. We offer many resources, special programs, and events to help you find off-campus housing in Boston and across the Northeastern network; connect with roommates; stay involved on campus; and serve as a link to your peers, alumni, and community. For students on co-op, our Network Housing support offers leased housing options in popular co-op locations.

We also help you understand your rights and responsibilities as a renter, understand your lease, and how to navigate landlord issues. Peer Community Ambassadors plan programs and events for you, are here to answer all of your questions, and help you meet your neighbors.

Our extensive website offers a host of resources including an apartment search database (<http://aptsearch.northeastern.edu/>); information on neighborhoods and transportation; as well as Northeastern, City of Boston, and Network Housing resources and relocation services.

Off Campus Engagement and Support publishes an e-newsletter that provides valuable tips and information on upcoming programs and events both on campus and off campus. Individuals interested in receiving our newsletter can sign up here (<http://offcampus.sites.northeastern.edu/newsletter/>) or email us at [offcampus@northeastern.edu](mailto:offcampus@northeastern.edu).

For more information, visit Off Campus Engagement and Support (<http://offcampus.sites.northeastern.edu/>).

## Office of the University Registrar

The Office of the University Registrar provides an important link between the university's academic programs and policies and the student. It administers a number of specific services, including class scheduling, registration, record functions, verification of enrollment, reporting, and transcript services.

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Office of the University Registrar website (<https://registrar.northeastern.edu/>)

[registrar@northeastern.edu](mailto:registrar@northeastern.edu)

617.373.2300

617.373.5351 (fax)

## Maintenance of Student Records

The Office of the University Registrar is responsible for ensuring appropriate maintenance and safekeeping of student records. The transcript, which is stored electronically and maintained indefinitely, is the holistic record of student attendance and degree progress. In the event that the university discontinues operations, the archive of student records would be maintained by:

Massachusetts Department of Higher Education

One Ashburton Place

Room 1401

Boston, MA 02108

## Financial Information

- Bill Payment (p. 145)
- Financial Aid Assistance (p. 147)
- Student Refunds (p. 149)
- Tuition and Fees (p. 150)

## Bill Payment

### Student Financial Services

617.373.2270

617.373.8735 (fax)

Student Financial Services Inquiry Form ([https://northeastern.service-now.com/sfs/?id=sfs\\_ask\\_a\\_question&sys\\_id=dfb56efd8731f15011b72fc5dabb35a8](https://northeastern.service-now.com/sfs/?id=sfs_ask_a_question&sys_id=dfb56efd8731f15011b72fc5dabb35a8))

Full payment of tuition and other related charges is due prior to the start of the term as specified on the original bill. For questions related to the billing process, late fees, payment methods, tuition payment plan, and refunds, contact us at the phone number and email address provided above.

### E-Bill

Tuition bills are generated electronically and are available via the Student Hub. Once your billing statement is available, you will be notified via email.

Bills must be paid by the due date on the initial billing statement. If a bill has not been received by the first week of the semester, contact Student Accounts.

### Payment of Tuition

Full payment of tuition, fees, and other related charges are due prior to the start of each semester. Payments will be accepted for billable charges only. Northeastern University is not able to process payments for more than the balance due on the student's account.

Accepted methods of payment are:

- **Electronic check (e-check):** Payments can be made online via NUPay on the Student Hub and are processed the same day they are received by the university.
- **International payments using Flywire:** Northeastern has partnered with Flywire to streamline the international wire payment process to the university. This service provides students and their families a safe, cost-effective, and convenient method of making payments to Northeastern in foreign currencies. To learn more about international payments through Flywire, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/billing-payments/payment-methods/>).
- **Monthly payment plan:** The monthly payment plan, administered through Flywire, allows students to divide their educational costs into smaller, more manageable installments. For additional information, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/billing-payments-financing-options/>).
- **Supplemental loans:** There are a number of educational loan programs available to assist students in financing their education. Review options at the Student Financial Services website (<https://studentfinance.northeastern.edu/billing-payments-financing-options/>).

For additional information regarding available payment and financing options, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/billing-payments/>).

### Student Financial Responsibility Agreement

As compelled by federal law, all students who enroll in classes at Northeastern are required to complete and accept the Student Financial Responsibility Agreement (<https://studentfinance.northeastern.edu/billing-payments/sfra/>). This agreement must be completed once per academic year and is located on the Student Hub. Failure to complete the SFRA will result in a hold that prevents attendance.

### VA Education Benefits

In accordance with Title 38 USC 3679 (e), covered individuals utilizing Chapter 31 or Chapter 33 education benefits at Northeastern University will not have any penalty imposed on their account nor will they be required to take out additional funding due to pending or late payments from the Department of Veterans Affairs as long as the Dolce Center for the Advancement of Veterans and Servicemembers has a current Certificate of Eligibility or VRE Authorization on file AND a Request for VA Benefit Certification is submitted through the Student Hub (<https://me.northeastern.edu>) portal.

COEs must be submitted before the start of the student's first term but do not need to be resubmitted unless entitlement information changes. Students are also required to complete the Request for VA Benefit Certification form through the Student Hub (<https://me.northeastern.edu>) portal before the start of each term they wish to use VA benefits. Students may have a hold placed on the account if there is an outstanding balance after payment from the VA is received by Northeastern.

### Discrepancies in Your Bill

Discrepancies in your bill should be addressed in writing, via the Student Financial Services Inquiry form, ([https://northeastern.service-now.com/sfs/?id=sfs\\_ask\\_a\\_question&sys\\_id=dfb56efd8731f15011b72fc5dabb35a8](https://northeastern.service-now.com/sfs/?id=sfs_ask_a_question&sys_id=dfb56efd8731f15011b72fc5dabb35a8)) to Student Financial Services. Include your name, Northeastern ID, account number, dollar amount in question, date of invoice, and any other information you believe is relevant.

If there is a discrepancy in your bill, pay the undisputed part of the bill to avoid responsibility for any late fees or financial holds.

## Late Fees

Northeastern has implemented a new policy regarding late fees. If the balance on a student's account remains unpaid, 30 days after the initial bill due date the university will impose a late fee of \$150 on the student's account. If the student's account balance remains unpaid after the initial late fee is assessed, the university will impose an additional 1% late charge once a month, until the balance is paid.

If a student or payer wishes to dispute a late fee assessment, they may review and submit the Late Fee Removal Request form ([https://service.northeastern.edu/sfs/?id=sc\\_cat\\_item&sys\\_id=af129a76dba03c10fab7440805961938&sysparm\\_category=d5e02da3db2f9010e783f3671d96195f](https://service.northeastern.edu/sfs/?id=sc_cat_item&sys_id=af129a76dba03c10fab7440805961938&sysparm_category=d5e02da3db2f9010e783f3671d96195f)).

## Tuition Paid Directly by Employers

When a third party pays tuition directly to the university, the student must provide the Office of Student Accounts with a purchase order or a written statement of intent to pay by the third party prior to the first week of classes. If there are stipulations associated with the payment agreement, such as a minimum grade level, then the student must either pay the university directly or enroll in one of the payment options.

Documents pertaining to a third-party agreement can be emailed to [thirdparty@northeastern.edu](mailto:thirdparty@northeastern.edu), faxed to 617.373.8735, or mailed to the address below:

Student Financial Services  
Northeastern University  
ATTN: Third-Party Billing  
354 Richards Hall  
360 Huntington Ave  
Boston, MA 02115

## Tuition Reimbursement

Many companies, embassies, and agencies directly reimburse students for their educational expenses upon successful completion of courses. In these situations, the student is responsible for paying the bill at the beginning of the semester or selecting another payment option. Tuition may not be left unpaid pending reimbursement by a third party. Check with your human resources department to see if you qualify.

If your company requires an official transcript to process the tuition reimbursement, you may request your transcript online (visit the Office of the University Registrar website (<https://registrar.northeastern.edu/article/transcript-requests>) for additional information about the transcript request process). Transcripts should be requested prior to the due date on your initial billing statement.

## Tuition and Fees and Default Policy

Tuition rates, all fees, rules and regulations, courses, and course content are subject to revision by the president and the Board of Trustees at any time. In cases where the student defaults on their tuition, the student shall be liable for the outstanding tuition and all reasonable associated collection costs incurred by the university, including attorneys' fees.

## Northeastern University Student Health Plan (NUSHP)

### GENERAL INFORMATION

Since September 1989, Massachusetts law (M.G.L. c.15A, § 18) has required every full-time and part-time student enrolled in a certificate, diploma, or degree-granting program in a Massachusetts institution of higher learning to participate in a Student Health Plan or in a health benefit plan with comparable coverage.

The Northeastern University Student Health Plan defines a full-time student as having full-time student status and enrolled in any amount of credits of a full-time curriculum.

NUSHP defines a part-time student as having part-time student status and enrolled in at least 75% of credits of the full-time curriculum (CPS undergraduate students—9 credits, CPS graduate students—6 credits).

The health fee is assessed each term on a student's account based on these definitions unless the student has previously waived the health plan fee in the current academic year.

Students on co-op or on study abroad are considered active students and will be enrolled in and billed for NUSHP each year.

Students enrolled in prematriculation and online programs are not eligible for NUSHP.

### HEALTH INSURANCE WAIVER

Eligible students are automatically enrolled in NUSHP each academic year and may waive NUSHP via the Student Hub (<https://me.northeastern.edu>) once they have been billed for NUSHP. In addition, to be eligible to waive, comparable coverage must be effective from the beginning of the term the student meets Student Health Program requirements.

The burden of proof that the alternative insurance is adequate falls upon the student choosing to waive. By submitting the waiver form, the student will be accepting responsibility for all medical expenses incurred, and neither Northeastern nor its Student Health Plan will be responsible for these expenses.

Northeastern reserves the right to verify that the student's insurance meets the criteria indicated. Disciplinary action may be taken if a student knowingly waives NUSHP without comparable coverage.

Visit the NUSHP website (<https://studenthealthplan.northeastern.edu/>) for waiver deadlines.

## Financial Aid Assistance

### Student Financial Services

617.373.5899 (Graduate)

617.373.2897 (College of Professional Studies)

Beginning fall 2023, all questions or concerns should be submitted using the **Student Financial Services Inquiry form**. ([https://northeastern.service-now.com/sfs/?id=sfs\\_ask\\_a\\_question&sys\\_id=dfb56efd8731f15011b72fc5dabb35a8](https://northeastern.service-now.com/sfs/?id=sfs_ask_a_question&sys_id=dfb56efd8731f15011b72fc5dabb35a8))

Northeastern University is available to assist students in developing a plan for financing a Northeastern education. Through a variety of options—including federal financial aid, Northeastern's monthly payment plan, supplemental loans, and your own resources—a plan can be designed that will make your education costs affordable. Visit the Student Financial Services website (<https://studentfinance.northeastern.edu/>) or contact the office directly for additional information.

### How to Apply

To apply for federal financial aid programs, students must submit the Free Application for Federal Student Aid (<https://studentaid.gov/h/apply-for-aid/fafsa/>) and include Northeastern's FAFSA school code, 002199. Students are strongly encouraged to submit their FAFSA by the priority filing deadline of **March 1** to ensure they are considered for all available financial aid programs.

To electronically sign your FAFSA, you will need your FSA ID. If you do not have one or have forgotten your FSA ID, visit the Federal Student Aid website (<https://studentaid.gov/>) to obtain one before starting the FAFSA.

### Federal Financial Aid Eligibility

Students in the graduate colleges must meet the following criteria to be eligible for federal financial aid:

- Be enrolled in at least 4 credits per term for federal financial aid, unless you are on a co-op, clinical rotation, residency, or are enrolled in a full-time or part-time stand-alone course
- Be a U.S. citizen or eligible noncitizen
- Be matriculated in a degree-granting program

*Please note that students enrolled in graduate certificate programs are not eligible for federal financial aid.*

- Have received a high school diploma or GED
- Be registered with Selective Service (if required)
- Not be convicted of a drug-related crime in the last year
- Not be in default from previous student loans
- Maintain satisfactory academic progress (<https://studentfinance.northeastern.edu/policies-procedures/satisfactory-academic-progress/>)

### Awarding Timelines

New students are awarded on an ongoing basis throughout the spring after we have been notified that they have been accepted into their program.

Returning students are awarded throughout the summer.

For information regarding your financial aid application, log into the Student Hub.

### Typical Graduate Financial Aid Award

Eligible students who file the FAFSA will be automatically considered for the Federal Direct Unsubsidized Loan, provided that all eligibility requirements have been met. The maximum amount that a student may borrow per academic year in the Federal Direct Unsubsidized Loan program is \$20,500.

For more information about the Federal Direct Loan Program, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/applying-for-aid/graduate/types-of-aid/>).

### Graduate Assistantships and Scholarships

Graduate assistantships and awards are offered directly by the individual graduate schools or academic departments. Students seeking such assistance should contact their graduate school for eligibility criteria.

To review a description of available scholarships, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/applying-for-aid/graduate/types-of-aid/>).

## **Health Professions Student Loans and Nursing Student Loans**

These federal loan programs carry a 5% interest rate during repayment. You must demonstrate financial need and meet Northeastern's priority filing date for consideration, as funds are limited. Northeastern is the lender, and repayment is made directly to Northeastern.

To be eligible for the Federal Nursing Student Loan, students must be enrolled at least half-time in the Bouvé College of Health Sciences. These loans carry a nine-month grace period prior to repayment following graduation, withdrawal, or a drop below half-time status. Repayment on the loan is for a period of up to 10 years with a minimum \$40 monthly payment. The loan may be prepaid at any time without penalty.

To be eligible for the Health Professions Loan Program, applicants must be enrolled full-time in the School of Pharmacy in the Bouvé College of Health Sciences. Additionally, students who would like to be considered for the Health Professions Loan Program must include parent income information when completing the FAFSA. These loans carry a 12-month grace period. Repayment on the loan is for a period of up to 10 years with a minimum \$40 monthly payment. The loan may be prepaid at any time without penalty.

## **Physician Assistant Loan**

The Physician Assistant Loan is awarded to full-time students in the graduate physician assistant program who demonstrate financial need after filing the FAFSA. The interest rate is fixed at 7%. Northeastern is the lender, and repayment is made directly to Northeastern. The loan amounts range from \$1,000 to \$3,000, depending upon the student's financial need. Repayment begins one month after the student ceases to be enrolled full-time at Northeastern.

## **Federal Direct Graduate PLUS Loan**

Unlike Federal Direct Unsubsidized Loans, the Federal Direct Graduate PLUS Loan (<https://studentfinance.northeastern.edu/billing-payments-financing-options/>) requires credit approval by the direct loan servicer.

Students have up to 25 years to repay the Federal Direct Graduate PLUS Loan. The Federal Direct Graduate PLUS Loan can be consolidated with Federal Direct Unsubsidized and Perkins loans upon graduation.

Graduate PLUS loans do not have a grace period. Repayment begins after a student is no longer enrolled at least half-time. Students who drop below half-time status and then reenroll above half-time status will need to request their loans be deferred again through their assigned direct loan servicer.

Graduate students who wish to apply for a Federal Direct Graduate PLUS Loan can do so online at [studentaid.gov \(https://studentaid.gov/app-launchPLUS.action/?plusType=gradPlus\)](https://studentaid.gov/app-launchPLUS.action/?plusType=gradPlus). For assistance with financial planning or determining the amount to apply for, please reach out to Student Financial Services.

## **Supplemental Student Loans**

There are a number of educational loan programs available to assist students in covering their expenses over and above any federal financial aid that may be awarded to them from Student Financial Services. Most private lenders have credit and income requirements that must be met before being approved for these programs. Additional information regarding private loans is available here (<https://studentfinance.northeastern.edu/billing-payments-financing-options/>). Student Financial Services recommends to students that, when researching the loan and lender that best meets their needs, they make sure they take into consideration the interest rate; quality of customer service; and origination, disbursement, and/or repayment fees.

## **General Financial Policies and Procedures**

### **FINANCIAL AID POLICIES**

Student Financial Services reserves the right to adjust a student's initial Offer of Financial Assistance based upon information brought to the office's attention subsequent to extension of the offer, including, but not limited to, increased or new institutional scholarships, outside scholarships, or revised family financial data.

### **APPEAL/CHANGE IN CIRCUMSTANCES**

If the student feels that the aid process does not accurately reflect their situation, or if family circumstances change during the year, the student should notify Student Financial Services for further evaluation. We may request additional documentation from you that might indicate a change in financial circumstances.

### **CHANGE IN ENROLLMENT STATUS**

Students must notify Student Financial Services about any change in planned period of enrollment, whether due to withdrawal from a class, a leave of absence, a change in co-op or academic division, or withdrawal from the university. Students should be aware that any change in enrollment status may result in a change in federal or institutional aid eligibility. It is the student's responsibility to notify Student Financial Services about any change in enrollment status and to ensure understanding of the ramifications of such changes. It is highly recommended that whenever possible, students discuss the impact of such changes with their financial aid counselor before making them.

### **OUTSIDE SOURCES OF AID**

Students must notify Student Financial Services of any aid received from outside sources, such as scholarships. Receipt of these sources may require an adjustment to a student's financial aid award.

## REAPPLICATION PROCESS

Students must reapply for financial aid each year by filing the FAFSA (<https://studentaid.gov/h/apply-for-aid/fafsa/>) online. To receive priority consideration for aid, the federal processor must receive the FAFSA by **April 1**.

## SATISFACTORY ACADEMIC PROGRESS

To continue receiving financial aid, graduate students must maintain the academic requirements for satisfactory progress set forth by their college. Refer to the Student Financial Services website (<https://studentfinance.northeastern.edu/policies-procedures/satisfactory-academic-progress/>) for more information about how satisfactory progress impacts financial aid eligibility.

## VERIFICATION

If a student is selected for verification (<https://studentfinance.northeastern.edu/federal-verification-process/>), Student Financial Services may be required to collect additional documents, including tax returns and other financial documents, to verify the information provided on the FAFSA. Aid cannot be disbursed until this process is completed.

## RETURN OF TITLE IV FUNDS

Northeastern is required by federal statute to recalculate federal financial aid eligibility for students who withdraw, drop out, are dismissed, or take a leave of absence prior to completing 60% of a term. Recalculation is based on the percentage of earned aid using the Federal Return of Title IV funds formula. Federal regulations require students to obtain at least one A, B, C, D, or S in at least one course for the term; students who receive all unsuccessful grades for a term (F, NE, W, I, U) may be considered unofficially withdrawn from the term and subject to an aid recalculation, including the possible loss of financial aid for that term.

## Student Refunds

### Refund Policies

Inquiries about credit balances should be directed to Student Accounts. Credit balances on a student's account will be automatically refunded.

Note the following exceptions:

- If the credit in your account is due to a Parent PLUS Loan, supplemental loan, and/or payment plan payment(s), the credit balance will be refunded to the bill payer on record unless a Refund Authorization form (<https://studentfinance.northeastern.edu/forms/>), stating that funds may be released directly to the student, is received from that borrower.
- If a credit card has been used to pay any portion of the amount due, the refund must be made first to that credit card. If the credit balance on the account exceeds the amount that was paid via credit card, these additional funds will be refunded by direct deposit or check.

For additional information regarding student refunds, including Frequently Asked Questions, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/policies-procedures/student-refund-requests/>).

### Official Withdrawal Adjustments

Students who officially withdraw, either from a course or from the university, during an academic term will receive a tuition refund based on the policy specified below. Institutional funds awarded by Northeastern University will be adjusted based on the actual charges incurred during the semester. Funds from federal Title IV programs will be returned to the government according to federal regulations. The federal government Return of Funds Policy dictates that a student's eligibility for federal financial aid is determined by the number of days enrolled during the semester. The refund will be calculated from the day the student submits an official notification of withdrawal to the Office of the University Registrar.

Tuition credits are granted through the first five weeks of a semester or first four weeks of a half semester, based on the date of the official withdrawal processed by the Office of the University Registrar. Nonattendance does not constitute official withdrawal. Credit policies vary according to the duration of the course. Typical tuition adjustments are made according to the following schedule. (The end of week three corresponds with the last day to drop a class without a W grade.)

### DURING FULL SEMESTER

During weeks one through three—100% refund

During the fourth week—60% refund

During the fifth week—40% refund

After the fifth week—No refund

### SUMMER HALF SEMESTERS AND COURSES OFFERED IN PART-OF-TERM FORMAT

During weeks one through two—100% refund

During the third week—50% refund

During the fourth week—25% refund

After the fourth week—No refund

### Leave of Absence Tuition and Fee Adjustments

Please refer to Leaves of Absence and University Withdrawal (p. 177).

## Disability Access Services Tuition Adjustments

Students who are registered with Northeastern's Disability Access Services (<https://drc.sites.northeastern.edu/>) and who are approved for a disability-related reduced course load may be eligible to petition the DAS for tuition adjustments directly related to their documented disability. Further information is available from the DAS.

## State-, Province-, and Country-Specific Refund Policies

For state-, province-, and country-specific refund information, visit the Student Financial Services website (<https://studentfinance.northeastern.edu/policies-procedures/>).

### Tuition and Fees

Please note:

- Courses taken outside of the student's home college may be billed at the per-credit rate of the college offering the course.
- Rates shown below apply to U.S. campuses only. Please visit Tuition and Fees for Students Studying at Canadian Campuses (<https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/canadian-campuses/>) for Canadian campus tuition and fee information.

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## University Interdisciplinary Programs

Graduate Program	Cost per Credit Hour
MS Complex Network Analysis	\$1815
MS Robotics	\$1864
MS Statistics	\$1800
MS Statistics—Connect	\$1800
Graduate Certificate, AI Applications (on-ground)	\$900

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## BOUVÉ COLLEGE OF HEALTH SCIENCES

Graduate Program	Cost per Credit Hour
All graduate programs, excepting specific programs listed below	\$1,880
• MS Applied Behavior Analysis	\$1,390
• MS Applied Psychology (Online)	\$1,000
• BSN Nursing—Accelerated Program for Second-Degree Students (ABSN)	\$1,307
• DMSc Healthcare Leadership	\$1,035
• DPT Physical Therapy—Postbaccalaureate Entry	\$20,800 (per semester)
• Graduate Certificate in Extreme Medicine	\$1,035
• MPH Public Health (Charlotte)	\$1,185
• MS Exercise Science	\$1,275
• MS Health Informatics	\$1,450
• MS Nursing—Direct Entry	\$22,510 (per semester)
• MS Nursing (Online)	\$1,000
• MS Physician Assistant	\$19,700 (per semester)
• MS Speech-Language Pathology	\$1,870
• PharmD Pharmacy—Direct Entry	\$31,654 (per semester)
• PharmD Pharmacy—Direct Entry, Clinical	\$15,934 (per semester)

• PharmD Pharmacy, Sixth Year	\$15,934 (per semester)
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**COLLEGE OF ARTS, MEDIA AND DESIGN**

Graduate Program	Cost per Credit Hour
All graduate programs, excepting specific programs listed below (p. 203)	\$ 1,989
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**COLLEGE OF ENGINEERING**

Graduate Program	Cost per Credit Hour
All graduate programs, excepting specific programs listed below (p. 402)	\$1,864
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**COLLEGE OF PROFESSIONAL STUDIES**

Graduate Program	Cost per Credit Hour
All graduate programs, except specific programs listed below	\$884
• DLP Law and Policy (self-paced, 69 QH program; new students as of 7/1/20)	\$1,100
• Executive DLP Law and Policy (students entering prior to 7/1/19)	\$2,305
• Executive DLP Law and Policy (69 QH program; new students as of 7/1/20)	\$1,599
• EdD Education	\$1,048
• MEd Education; MAT Teaching (excluding MEd Higher Education Administration)	\$726
• MS Project Management	\$884 (students entering before 6/30/2024)
	\$935 (students entering 7/1/24-6/30/25)
• MPS Analytics; MS Commerce and Economic Development; MPS Applied Machine Intelligence	\$998 (students entering before 7/1/20)
	\$1,057 (students entering 7/1/20-6/30/21)
	\$1,097 (students entering 7/1/21-6/30/22)
	\$1,161 (students entering 7/1/22-6/30/23)
• MPS Informatics and MPS Digital Media	\$970 (students entering before 7/1/20)
	\$1,025 (students entering 7/1/20-6/30/21)
	\$1,065 (students entering 7/1/21-6/30/22)
	\$1,127 (students entering 7/1/22-6/30/23)
• MS Global Studies and International Relations; MS Regulatory Affairs	\$909
• MSTC Technical Communication	\$909
• MEd Higher Education Administration	\$799
• Master's-level graduate courses for personal and professional enrichment (nondegree)	\$884

**COLLEGE OF SCIENCE**

<b>Graduate Program</b>	<b>Cost per Credit Hour</b>
All graduate programs, except specific programs listed below.	\$1,863
• MS Environmental Science and Policy	\$1,830
• MS Marine Biology	\$1,604
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**COLLEGE OF SOCIAL SCIENCES AND HUMANITIES**

<b>Graduate Program</b>	<b>Cost per Credit Hour</b>
All graduate programs, excepting specific programs listed below	\$1,397
• MS Criminology and Criminal Justice	\$1,046
• MS Economics	\$1,535
• MPA Public Administration	\$1,020
• MPP Public Policy	\$979
• MS Resilience Studies	\$979
• MS Security and Resilience Studies	\$979
• MA English	\$1,346
• MA History	\$1,346
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**D'AMORE-MCKIM SCHOOL OF BUSINESS**

<b>Graduate Program</b>	<b>Cost per Credit Hour</b>
All graduate programs except specific programs listed below. Please also see the second table below for fees billed in addition to tuition for some programs.	\$1,816
• MBA Business Administration—Online	\$900
• MS Management with concentrations in Digital Transformation in Healthcare or Healthcare Administration (online only)	\$800
• MSAMBA Accounting and Business Administration	\$74,675 (program rate)

<b>Item</b>	<b>Fee</b>
All campus-based, full-time graduate programs, except specific programs listed below.	\$1,600 billed in year 1 in two installments (\$800 each), fall and spring terms
• Business Administration, MBA—Full-Time	\$3,100 billed in year 1 in two installments (\$1,550 each), fall and spring terms
• Finance and Business Administration, MSFMBA	\$3,100 billed in year 1 in two installments (\$1,550 each), fall and spring terms
• Quantitative Finance and Business Administration, MSFMBA	\$3,100 billed in year 1 in two installments (\$1,550 each), fall and spring terms
• Law, JD/Business Administration, MBA	\$3,100 billed in year 1 in two installments (\$1,550 each), fall and spring terms
• LLM/Business Administration, MBA	\$3,100 billed in year 1 in two installments (\$1,550 each), fall and spring terms

• MS Management with concentration in Strategic Technology Leadership (hybrid only)	\$3,000 billed in year 1 in two installments (\$1,500 each), fall and spring terms
• MSA Accounting	\$0

**KHOURY COLLEGE OF COMPUTER SCIENCES**

Graduate Program	Cost per Credit Hour
All graduate programs, excepting specific programs listed below	\$1,785
• MS Cybersecurity	\$1,682
• MS Data Science/MS Data Science—Align	\$1,856
• Graduate Certificate Data Analytics	\$1,856
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**MILLS COLLEGE AT NORTHEASTERN UNIVERSITY**

Graduate Program	Cost per Credit Hour
MA Single Subject Education (p. 1124)	\$768
MS Multiple Subject Education (p. 1123)	\$768
MA Education Leadership (p. 1122)	\$768
MA Early Childhood Education (p. 1120)	\$698

**SCHOOL OF LAW**

Graduate Program	Cost per Credit Hour
All programs, excepting specific programs listed below	\$62,826 (per academic year)
• JD Law, Part-Time Option (FlexJD)	\$47,112 (per academic year)
• LLM Law (On Ground)	\$62,826 (per academic year)
• LLM Law—Online	\$1,507
• MLS Legal Studies—Online	\$1,172
• MS Media Advocacy (interdisciplinary program with CAMD)	(Please see College of Arts, Media and Design above)
• Graduate Certificates, Online	\$1,172

**OFFICE OF THE PROVOST**

Graduate Program	Cost per Credit Hour
All graduate programs, excepting specific programs listed below	\$1,864
• All PhD Programs	\$15,000 (per semester, \$45,000 for 12-month year)

**DISSERTATION AND CONTINUATION**

Item	Fee
Master's or professional doctorate continuation fee (flat rate)	Equivalent to the college per-credit-hour rate listed above

**FEES**

Visit Fee Descriptions (<https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/fee-descriptions/>) for more details.

Item	Fee
Student Center Fee (per term, Boston campus only)	\$72, full time \$10, part time
College of Professional Studies Student Center Fee (per quarter, Boston campus only)	\$8.25
Student Recreation Fee (per term)	\$62, full time \$31, part time
College of Professional Studies Student Recreation Fee (per quarter, Boston campus only)	\$19
Student Activities Fee (per term, Boston campus only)	\$17
Residential Student Fee (per term)	\$35
Health and Counseling Fee	\$225
Health Plan Fee (yearly, optional) ( <a href="https://studenthealthplan.northeastern.edu">https://studenthealthplan.northeastern.edu</a> )	\$2,499
Parking (per semester, optional) ( <a href="https://www.masparc.com/products/">https://www.masparc.com/products/</a> )	
International Student Fee	\$375
Oakland Student Activities (ASMC) Fee (per term)	\$100
Oakland AC Transit Fee (per term)	\$71.50
Oakland Campus Comprehensive Fee (per term)	\$636.50
Student Tuition Recovery Fund (STRF) Fee	Assessed annually*

\*The state of California mandates an STRF fee, at a rate of \$2.50 per \$1,000 of institutional charges, to students who are California residents or are enrolled in a residency program.

## Academic Policies and Procedures

### Universitywide Academic Policies and Procedures

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- Academic Consequences for Violating the University Academic Integrity Policy (p. 157)
- Accommodations for Students with Disabilities (p. 158)
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- Code of Student Conduct (p. 160)
- Course Credit Guidelines (p. 174)
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## **Academic Integrity Policy**

A commitment to the principles of academic integrity is essential to the mission of Northeastern University. The promotion of independent and original scholarship fosters an environment where students derive the most from their educational experience and their pursuit of knowledge. Academic dishonesty violates the most fundamental values of an intellectual community and undermines the achievements of the entire university.

As members of the academic community, students must become familiar with their rights and responsibilities. In each course, they are responsible for knowing the requirements and restrictions regarding research and writing, examinations of whatever kind, collaborative work, the use of study aids, the appropriateness of assistance, and other issues. Students are responsible for learning the conventions of documentation and acknowledgment of sources in their fields. Northeastern expects students to complete all examinations, tests, papers, creative projects, and assignments of any kind according to the highest ethical standards, as set forth either explicitly or implicitly in this policy or by the direction of instructors.

The following is a broad overview, but not an all-encompassing definition, of what constitutes a violation of academic integrity.

### **Cheating**

The university defines cheating as using or attempting to use unauthorized materials, information, or study aids in any academic exercise. When completing any academic assignment, a student shall rely on their own mastery of the subject.

Examples include, but are not limited to:

- Unauthorized use of aids such as, but not limited to, notes, text, the internet, artificial intelligence, chatbots, cellphones, etc., to complete any academic assignment
- Copying from another student's current or past academic work
- Unauthorized communication during an examination
- Handing in the same academic material, in part or in total, for more than one course without explicit permission from the instructor(s)
- Intentionally viewing a test before it is administered
- Storing notes on paper or in a portable electronic device for use during an examination

### **Fabrication**

The university defines fabrication as falsification, misrepresentation, or invention of any information, data, or citation in an academic exercise.

Examples include, but are not limited to:

- Inventing data, facts, or sources for an academic assignment
- Altering the results of a lab experiment or survey
- Citing a source in a bibliography that was not used
- Stating an opinion as a scientifically proven fact

## **Plagiarism**

The university defines plagiarism as using as one's own the words, ideas, data, code, or other original academic material of another without providing proper citation or attribution. Plagiarism can apply to any assignment, either final or drafted copies, and it can occur either accidentally or deliberately. Claiming that one has "forgotten" to document ideas or material taken from another source does not exempt one from plagiarizing.

Examples include, but are not limited to:

- Word-for-word quotations from a source, including another student's work
- Paraphrasing (using the ideas of others in your own words)
- Unusual or controversial facts not widely recognized
- Audio, video, digital, or live exchanges of ideas, dialogue, or information
- Charts, diagrams, graphics, and images
- Recycling or reusing one's own specific words from previously published texts.

Students unclear as to whether or not a source requires citation should speak with their professor or consult the Writing Center (<https://cssh.northeastern.edu/writingcenter/>).

## **Unauthorized Collaboration**

The university defines unauthorized collaboration as instances when students submit individual academic works that are substantially similar to one another. While several students may have the same source material, any analysis, interpretation, or reporting of data required by an assignment must be each individual's independent work unless the instructor has explicitly granted permission for group work.

Examples include, but are not limited to:

- Submitting work that closely matches that of another student, even when the work is to be original to the student handing in the assignment
- Sharing a take-home examination, case write-up, lab report, or any other assignment with a peer or on any nonpersonal portfolio website such as, but not exclusive to, Chegg, CourseHero, Quizlet, etc., without express permission from the instructor

## **Participation in Academically Dishonest Activities**

The university defines participation in academically dishonest activities as any action taken by a student with the intention of gaining an unfair advantage over other students.

Examples include, but are not limited to:

- Misrepresenting oneself or one's circumstances to an instructor
- Stealing an examination
- Purchasing a prewritten paper
- Selling, loaning, or otherwise distributing materials intended for the purpose of cheating, plagiarism, or other academically dishonest acts
- Destroying, altering, stealing, or forging another student's work, library materials, laboratory materials, academic records, course syllabi, or examination/course grades
- Intentionally missing an examination or assignment deadline to gain an unfair advantage
- Forging information or signatures on official university documents such as, but not limited to, attendance logs, resumés, cover letters, honesty statements, etc.

## **Facilitating Academic Dishonesty**

The university defines facilitating academic dishonesty as intentionally or knowingly helping or contributing to the violation of any provision of this policy.

Examples include, but are not limited to:

- Doing academic work for another student
- Making available previously used academic work for another individual who intends to resubmit the work for credit

## **Obligation to Uphold Academic Integrity**

All members of the Northeastern community have a role in upholding the Academic Integrity Policy. Any member of the community who witnesses a violation of this policy should report it to the appropriate faculty member or the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>). All instructors are required to refer to Northeastern's Academic Integrity Policy in their course syllabi.

## **Options for Instructors Reporting Alleged Violations of the Academic Integrity Policy**

A faculty member who suspects a student in their class, or working under their direction, of violating the Academic Integrity Policy can choose to:

- File official charges with the OSCCR
- Submit the complaint as an “information only” case to request that the incident be kept “on file” for the student

The director of OSCCR will review all complaints submitted against a student to determine whether sufficient evidence for a violation of the Academic Integrity Policy exists. If the director determines that the evidence of a potential violation is sufficient, the case will be assigned to a staff member within OSCCR. An instructor who believes that a student made an unintentional mistake should note that belief in an Academic Integrity report. The director of OSCCR, or designee, will review the report along with supplemental documents provided and any prior student conduct history to determine if an administrative hearing is necessary or if an “Information Only” educational reminder notice is appropriate to increase learning and awareness of campus resources. The faculty member is advised to speak with any student they intend to report for an alleged violation of the Code of Student Conduct.

## Sanctions

Hearing officers and the Student Conduct Board have discretion to impose sanctions for a responsible finding of an Academic Integrity violation that range in severity from a written warning to expulsion and include an action taken by the student to help rebuild trust within the community.

Hearing officers will take the following into consideration when determining appropriate sanctions for violations of the Academic Integrity Policy.

- Nature of the violation(s)
- Severity of the damage, injury, or harm resulting therefrom
- Student's past student conduct record
- Mitigating circumstances
- Aggravating circumstances

## Appeals

Students may appeal the disciplinary actions of an Academic Integrity violation on the three grounds identified in the Code of Student Conduct. The appeals process outlined in the Code of Student Conduct (p. 160) will be used for such appeals. Please refer to the Code of Student Conduct (p. 160) for a complete description and explanation of the appeals process.

## Grading Authority

OSCCR does not have authority over assignment or course grades. Therefore, a student who violates Northeastern’s Academic Integrity Policy may also be subject to academic penalties (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-consequences-violating-academic-integrity-policy/>) at the discretion of the instructor in the course. This can result in, but is not restricted to, the student failing the course. A student with questions about the academic appeals process should contact the academic advisor to review that process.

## Academic Consequences for Violating the University Academic Integrity Policy

The purpose of the Code of Student Conduct (p. 160) is to set forth Northeastern University’s expectations of behavior that promote the safety and welfare of the Northeastern community. The Code of Student Conduct gives an overview of what constitutes a violation of academic integrity. Violations of the Code are handled and/or overseen by the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>).

Hearing officers and the Student Conduct Board have discretion to impose sanctions for a “responsible” finding of an academic integrity violation that range in severity from a written warning to expulsion and include an action taken by the student to help rebuild trust within the community. OSCCR does not have authority over assignment of course grades. Therefore, a student who violates Northeastern’s Academic Integrity Policy may also be subject to academic consequences at the discretion of the instructor in the course.

When a student has been found responsible for violating the Academic Integrity Policy, faculty members have the discretion to apply an academic consequence. Academic consequences may include:

- **Resubmission:** resubmission of an assignment, or retaking an exam or quiz, without penalty
- **Single grade reduction:** reduction of grade or failure on project, exam, quiz, or other academic exercise on which the student was found responsible for violating the Academic Integrity Policy
- **Course grade reduction:** reduction of course grade or failure in the course

Consequences of violating academic integrity should be described in the course syllabus. When assigning consequences, faculty may consider:

- The student’s familiarity with academic integrity expectations
- The amount of instruction the student has had on the violation
- The percentage of the assignment/assessment affected by the alleged violation
- The value of the affected assignment/assessment on the course grade
- The impact of the violation on others

Academic consequences may be applied through a process defined by the college.

## Accommodations for Students with Disabilities

617.373.2675

617.373.7800 (fax)

Website (<https://drc.sites.northeastern.edu/>)

Northeastern University and **Disability Access Services** are committed to providing disability services that enable students who qualify under Section 504 of the Rehabilitation Act and the Americans with Disabilities Act Amendments Act to participate fully in the activities of the university. To receive accommodations through DAS, students must provide appropriate documentation that demonstrates a current significant limitation and the corresponding need for adjustments or services. DAS evaluates the information provided by students and their clinicians on a case-by-case basis and makes an individualized determination about requested adjustments based on an informed and interactive process. Adjustments and services are available for students with the following diagnoses, among others:

- Learning disabilities and/or ADHD
- Autism spectrum disorders
- Chronic or degenerative disorders
- Hearing loss
- Mobility impairments
- Psychiatric disorders
- Traumatic or acquired brain injury
- Vision impairments

Students should provide documentation to **DAS** at their earliest convenience to allow for sufficient time for review. After the documentation has been reviewed, a disability specialist will contact the student regarding appropriate next steps. Visit the DAS website (<http://www.northeastern.edu/drc/>) for additional information or contact staff at 617.373.2675.

## Attendance Requirements

Class participation is essential to success no matter the course format or its delivery. Individual instructors may have course-specific attendance policies. It is the student's responsibility to ascertain what each instructor requires. Failure to meet attendance requirements may force a student to drop the applicable courses. Students should not make conflicting commitments until the class schedules for each semester are final. Permission to make up work may be granted by instructors for reasonable cause. Requests must be made immediately upon a student's return to class. Laboratory work can be made up only during the hours of regularly scheduled instruction.

## Absence Because of University-Sponsored Activities

Participation in university-sponsored activities, where the students are representing their university, college, or department, may cause absences from class that qualify as excused absences. Excused absences, with appropriate prior arrangement, are not subject to penalty, and missed work may be satisfied through agreement between the student and the instructor. University-sponsored activities that may justify excused absences include athletic competition, performing arts events, and research or other presentations.

Students must discuss absence(s) with instructors at least two weeks in advance of the university-sponsored activity, or as soon as possible if the activity is at the beginning of the term or is the result of an unforeseen circumstance. Instructors may require a written statement from the administrator in charge of the activity. Instructors are expected to make reasonable accommodations for these class absences, including administration of makeup assignments and exams whenever possible. It is expected that students seeking an excused absence will develop a plan and timetable to make up the missed coursework with their instructor(s). Note, however, that the requirements of some courses or programs may preclude such accommodations.

## Absence Because of Religious Beliefs

Any student who is unable, because of their religious beliefs, to attend classes or to participate in any examination, study, or work requirement should be provided with an opportunity to make up such examination, study, or work requirement that they may have missed because of such absence on any particular day, provided that such makeup examination or work does not create an unreasonable burden upon the university. Students should make appropriate arrangements with the instructor in advance of the absence, preferably at least two weeks before the religious observance.

## Absence Because of Jury Duty

Members of the university community are expected to fulfill their obligations to serve on a jury if called upon. A student selected for jury duty should inform their instructors. They will provide a reasonable substitute or compensatory opportunities for any required work missed. A student with such an absence will not be penalized in any way.

## Absence Because of Military Deployment

See Leave of Absence Due to Military Deployment (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#military>).

## Other Absences

Unforeseen events or circumstances, including illness, may cause a student to be absent from class. Students must notify their instructors and academic advisor, as appropriate, as soon as possible to apprise them of the circumstances leading to their absence, as well as how much time will be missed. Students must work with their instructors to develop a plan, with a timetable, to make up missed coursework. Students cannot be required to provide medical documentation. (Faculty and students should note that the University Health and Counseling Services does not provide sick notes or medical excuses except for long-term illness.) Instructors are expected to make reasonable accommodations for warranted class absences, including administration of makeup assignments and exams, whenever possible.

## Extended Absences

A student who is absent from school for an extended period of time must inform their academic advisor by letter, email, or telephone. The expected length of the absence may determine whether the student should apply for a medical or emergency leave of absence (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/leaves-of-absence-withdrawal/#medical>). It is strongly recommended that the student contact their academic advisor to discuss potential next steps, which could include incomplete grades; withdrawal from classes; or, in the event of an extended absence due to a chronic medical condition or disability, consultation with Disability Access Services to explore potential accommodation.

## Nonattendance

Nonattendance does not constitute official course dropping or withdrawal, which means the student is fully responsible for the academic and financial consequences. Like all grades for courses attempted and/or completed, a grade earned due to nonattendance impacts a student's academic progression, an international student's visa eligibility, and a federal financial aid recipient's aid eligibility and award.

## Campus Transfer and Campus Location Change

### Campus Transfer

Students may request an official campus transfer from their school/college to complete their program. The program has to be approved by the school/college academically AND meet regulatory requirements (state/provincial licensure). If the student is an international student, the program has to be offered in compliance with nonimmigrant status/study permit requirements at the requested new home campus location. International students should seek advice from the Office of Global Services (<https://international.northeastern.edu/ogs/>) before the final decision to transfer to another campus.

### Campus Location Change

Students may request a campus location change to a new campus (the host campus) for a period no longer than one academic year (two consecutive semesters or three consecutive quarter terms) and no more than 50% of a degree program. It must be approved by the school/college academically, and courses must be offered that allow the student to make normal academic progress in compliance with regulatory requirements. In order for international students to change a campus location, the academic program has to be offered in compliance with nonimmigrant status/study permit requirements at the requested host campus location.

## Clearing an Academic Deficiency

An academic deficiency occurs when a student fails to complete a course with a satisfactory grade. The deficiency may occur because the student has failed the course or because the student has passed the course but with a grade that does not meet the minimum required by the student's program.

Students who have academic deficiencies may be required to clear them before progressing within the curriculum, especially if a given course is a prerequisite for future coursework. Deficiencies may affect the student's expected year of graduation.

With the approval of the appropriate program faculty and/or academic advisor, students can clear deficiencies in the following ways:

1. Retake the same course at one of Northeastern University's colleges, which will result in a "retake" grade (see "Retaking Courses" in this section of the catalog).
2. Substitute a comparable course at one of Northeastern's colleges, which will result in a "retake" grade (see "Substituting Courses" in this section of the catalog).
3. Under special circumstances, if the course is not currently offered at Northeastern, a student may be advised to take a preapproved course at another institution outside Northeastern. The original grade will remain on the student's Northeastern transcript and will still be used in the calculation of the GPA.

## Code of Student Conduct

*Adopted November 12, 1971; last revised in August 2024.*

The purpose of the Code of Student Conduct (the Code) is to set forth the university's expectations of behavior that promotes the safety and welfare of the Northeastern University community. The university seeks to provide a supportive environment that is conducive to learning, the pursuit of truth, the exchange of knowledge, the intellectual development of students, and the general good of society. In those instances where violations of the behavioral expectations occur, Northeastern has developed policies and procedures to protect the interests of members of the university community, individually and collectively. The Code has been developed with the assistance of students, faculty, and staff of the university.

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### Applicability of the Code On and Off Campus/Jurisdiction of the Code

The Code applies to all Northeastern students, at all levels of study, in all colleges and programs, at all locations in the United States or abroad, on-ground or online, as well as all student groups and organizations. It applies to all Northeastern students both on and off campus. The university establishes guidelines for the behavior of its students to promote student conduct that does not adversely affect the educational mission of the university; members of the university community; and the university's relationship with the surrounding community, partner institutions, or co-op partners. Student behavior occurring off campus that allegedly violates the Code; university policy; local, state, federal, or host country laws; and that could negatively affect the educational mission of the university or its relationship with the surrounding community may subject students to discipline as noted in the Code.

Alleged violations of the Code are handled and/or overseen by the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>) (OSCCR). Because the conduct process is an educational process and not a legal or criminal one, the formal legal rules of evidence do not apply to the Code and its procedures. The Code states all rights applicable to the conduct process. Students may not access documents not included in their case packet, demand access to individuals, or compel witnesses to participate in the conduct process. For information regarding Title IX, sexual violence, and related rights and procedures, please refer to the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://catalog.northeastern.edu/policies.northeastern.edu/policy104/>), which governs the investigation, adjudication, appeal, and other elements of the university's response to allegations of conduct that may constitute sexual or gender-based harassment or misconduct.

The Code also applies to all accepted and prematriculated students. The university reserves the right to adjudicate an accepted student who allegedly engages in prohibited conduct prior to matriculation (e.g., at the university's New Student Orientation programs, while moving in, or prior to the official start of the semester) through the conduct process.

When a student withdraws, takes a leave of absence, or becomes inactive from the university after allegedly engaging in conduct that may violate any of the university's policies, rules, regulations, or standards of conduct, but before the alleged violation has been adjudicated through the conduct process, a hold will be placed on the student's record and the student will be banned from campus. The hold will prevent a student from reenrolling at the university until the alleged violations have been resolved. The university reserves the right to delay the awarding of a degree, certificate, badge, or other credential pending the resolution of the student conduct process. In the event a student is found responsible for violating university policy and the sanction is expulsion, the student will not be eligible to be awarded their pending credential. The university also reserves the right, in its discretion, to revoke degrees.

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### General Expectations

As citizens and as members of an academic community, students enjoy the same basic privileges and are bound by the same responsibilities as all citizens. Presence on campus and/or student status does not shield students from the law. Northeastern assumes that all students will abide by the policies, rules, and regulations of the university and by state, local, federal, and host country laws. The university reserves the right to inform the police or other appropriate authorities when student behavior appears to violate laws.

It is recognized that all members of an academic community, individually and collectively, have a right to express their views publicly on any issue; however, the university insists that all such expressions be peaceful and orderly, conducted in a manner consistent with the Code and university policies, and in such a way that university business and respectful academic discourse are not unduly disrupted. Northeastern students seeking to demonstrate on university property and/or in connection with a university event must comply with all applicable university policies (<https://policies.northeastern.edu/policy617/>), protocols, procedures, and requirements. Moreover, students must clearly indicate that they are speaking as individuals and not for or on behalf of the university community.

Students are expected to display proper respect for the rights and privileges of other members of the university community and their guests. The atmosphere on university property, in university facilities, online, and at university programs and events must be free from undue disruption. Furthermore, students must comply with all directions issued by university officials (including Northeastern University Police Department officers and other public safety officers acting on behalf of the university). Students are expected to be honest and forthright in their dealings with the university. Falsification, distortion, or misrepresentation of information to the university or university officials could result in being charged with a violation of the Code.

Students are expected to engage directly with OSCCR regarding any alleged violations of the Code. While students are free to consult with advocates and third parties, such third parties are not permitted to ask or communicate on behalf of students in the student conduct process. Additionally, recordings of any kind are not permitted in OSCCR, except as permitted by the Code or with express permission of OSCCR staff.

### STUDENT EXPECTATIONS

*Each Northeastern student can expect:*

1. Written notification of alleged Code or university policy violations within a reasonable period of time from OSCCR's receipt of the complaint or incident report pertinent to those allegations. This notification will state the role of the involved student (such as charged student, victim, etc.) and date, time, and place of the administrative hearing or prehearing meeting, in the case of a Student Conduct Board (the Board) hearing. The date, place of incident, and the complainant and/or reporting party (where permitted by law and university policy) will also be included.
2. The opportunity to request to reschedule a hearing date up to one business day prior to the hearing, due to academic or other reasonable conflicts. Requests may be granted at the discretion of OSCCR.
3. The opportunity to request that a hearing be suspended after the presentation of information for a brief and agreed-upon period of time.
4. The opportunity to coordinate with Disability Access Services (<https://drc.sites.northeastern.edu/>) to request any accommodations or adjustments needed to participate in the conduct process in an equitable manner.
5. The option to request OSCCR to provide speech translation services during the hearing process.
6. The hearing may proceed without the student's presence, consistent with the Code.
7. OSCCR to make reasonable efforts to issue the decision letter within 10–15 business days after the conclusion of the hearings pertinent to the case.
8. The option to choose a Hearing Advisor, as outlined within the Structure and Procedure section of the Code, to serve as a guide throughout the student conduct hearing process.
9. The option to file an appeal within five business days. Further information regarding appeals is outlined within the Procedures for Student Appeals section of the Code.

*In cases where a Board hearing is scheduled, the following procedural rights also apply:*

1. To review written information received by OSCCR that is pertinent to the case (subject to any applicable privacy laws or policies), a minimum of one business day prior to the designated Board hearing date, and to address inferences that might be drawn from such statements during the Board hearing.
2. To a hearing before a panel composed of three or five Board members or, at the discretion of the director of OSCCR or designee, three members of the OSCCR staff.
3. To request the removal of names from the list of prospective Board members, with reasonable notification and explanation.
4. To question witnesses, to produce witnesses on the student's own behalf, and to present substantiating information and written personal statements on the student's own behalf. Witnesses are individuals who were present for the incident in question and/or have information relevant to the incident.

*Each Northeastern student has the responsibility:*

1. To review and abide by the Code and university policies and procedures, both academic and otherwise, until the conferring of their degree.
2. To monitor their university email address and respond to any Northeastern notifications sent directly to the individual student.
3. To maintain their local address information and update it at the beginning of each semester when they are an active student.
4. To represent the university appropriately, both on and off campus.
5. To respect the differences of individuals and treat others in a civil and respectful manner.
6. To carry their university ID with them at all times and present it to officials when requested.
7. To honor their fiscal responsibilities to the university.

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### Decision-Making Authority

1. The senior vice chancellor for student life is responsible for the overall administration of the Code, as well as the student conduct process, as it applies to individuals and student groups. Under the oversight of the senior vice chancellor for student life, the director of OSCCR has been charged with the day-to-day responsibility for administering the Code and the student conduct process.
2. All decisions made by the Board, Hearing Administrator, Appeals Board, and/or Fraternity and Sorority Life Standards Boards are subject to final approval and modification by the senior vice chancellor for student life, or designee.
3. The Board and designated Hearing Administrators are authorized to take official disciplinary actions in accordance with the policies, regulations, and sanctions contained in the Code and other policies and regulations of the university.
4. The policies and procedures outlined in the Code will at all times govern the adjudication of matters relating to the Code.

## Structure and Procedure of the Student Conduct Process

The student conduct process begins when a report alleging a violation of the Code is received by OSCCR, Residential Life, Global Experience Office, or the Center for Student Involvement. For information regarding Title IX, sexual violence and misconduct, and related rights and procedures, please refer to the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>), which governs the investigation, adjudication, appeal, and other elements of conduct prohibited under that policy. Notwithstanding the procedures established in the Code, the university reserves the right to act in a manner it deems necessary or appropriate to address alleged Code violations and promote the safety and well-being of the campus community, including but not limited to altering specific elements and procedures within the Code as necessary to achieve this goal. The university specifically reserves the right to delay the awarding of a degree, certificate, badge, or other credential pending the completion of the student conduct process.

Reports of sexual and gender-based harassment and misconduct (including sexual harassment, sexual assault, domestic violence, intimate partner violence, dating violence, stalking, or retaliation) involving students are addressed by the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>) and separate procedures referenced in that policy, which outline the investigation and resolution of claims of conduct prohibited by that policy. Reports of prohibited conduct can be submitted directly to the Title IX coordinator and the Office for University Equity and Compliance (OUEC) (<https://www.northeastern.edu/ouec/>) via several reporting options (<https://ouec.northeastern.edu/reporting-options/>).

### FILING A REPORT

Incident reports can be submitted by clicking on Report an Incident (<https://osccr.sites.northeastern.edu/report-an-incident/>). Any academic or administrative official, university staff member, faculty member, law enforcement agency, member of the community, or student may file a complaint involving any student or student organization. The complaint should include the following information, if available:

1. Name(s) of the student or student organization alleged to have violated the Code and/or university policy
2. Description of the incident
3. Date of the incident
4. Names and contact information of witnesses
5. Names and contact information of those filing the report

In most instances, the person who submits a report will serve as the complainant if the report results in resolution through a Board hearing.

### THE ROLE OF THE OFFICE OF STUDENT CONDUCT AND CONFLICT RESOLUTION

The role of OSCCR (<https://osccr.sites.northeastern.edu/>) is to review all reports it receives to determine if a violation of the Code allegedly occurred and to oversee or directly resolve complaints of an alleged violation. OSCCR does not represent either party. From time to time, OSCCR may conduct or participate in an investigation to gather information about the alleged violation(s).

### REVIEWING THE REPORT AND DETERMINING HEARING TYPE

The director of OSCCR, or designee, reviews the report to determine if a violation of the Code allegedly occurred. The severity of the alleged violation is also considered, as this determines the type of hearing that generally will be used to resolve the complaint/case. In most cases, off-campus legal proceedings will not be grounds for delay. OSCCR will determine in each case the appropriate hearing type to resolve charges. However, if either party has concerns about this, the party should communicate such concerns to the Hearing Administrator. OSCCR retains the right to determine when and in what format any alleged Code violations are heard through administrative hearing or Board hearing, as well as the timing of such hearing.

- Administrative hearing—When the severity of the alleged violation(s) could result in sanctions of written warning, disciplinary probation, or deferred suspension, involved students will receive a hearing notice requesting their attendance at an administrative hearing.
- Student Conduct Board—When the severity of the alleged violation(s) could result in sanctions of suspension or expulsion, or if the facts of the incident are so complex that an administrative hearing is not appropriate, involved students will receive a hearing notice requesting their attendance at a prehearing, which precedes a Board hearing.
- End-of-term hearings—Incidents that occur and/or matters that are being scheduled to be heard during the last two weeks of classes, or finals, may be resolved by one of the following end-of-term hearing processes:

Board level—Incidents that may result in suspension or expulsion, or if the facts of the incident are so complex that an administrative hearing is not appropriate, may be resolved by an administrative hearing held prior to the end of the term or a Board hearing for the following term.

Administrative level—Incidents that will not result in suspension or expulsion may be resolved by an administrative hearing held prior to the end of the term or immediately following the end of the term.

When distance precludes a student from having a face-to-face Board hearing or administrative hearing with a member of OSCCR, the case may be resolved via a video conference or phone hearing.

*PLEASE NOTE:* OSCCR will take into account the severity of the incident when determining the most appropriate method of resolving end-of-term cases.

- Alternate resolution—The OSCCR reserves the right to determine if the incident can be resolved by alternative means (e.g., mediation). All parties involved must agree to this, as the outcome of this alternate resolution is final.

*PLEASE NOTE:* In all cases, the university reserves the right to use an administrative hearing to expediently resolve cases where the university determines it is appropriate to do so.

Determining responsibility—In all hearings, the Hearing Administrator or Board will use the “preponderance-of-evidence” standard, also known as “more-likely-than-not” standard, to determine if a violation of the Code occurred.

## **HEARING ADVISORS**

Students participating in the student conduct process may choose a member of the university community who has been trained by OSCCR to serve as a Hearing Advisor. Students will receive a list of members from the university community who have volunteered to serve as a Hearing Advisor and been trained in the conduct process. Visit OSCCR’s website for a full list of current Hearing Advisors (<https://osccr.sites.northeastern.edu/hearing-advisors/>). Staff or faculty who represent a student as legal counsel outside the conduct process may not act as the student’s Hearing Advisor in the university process, except as permitted under the university’s Policy on Sexual and Gender-Based Harassment and Title IX. Students who wish to have a Hearing Advisor present with them during meetings should communicate to OSCCR availability that is inclusive of the Hearing Advisor’s schedule. Appointments will not be rescheduled solely due to a Hearing Advisor’s inability to attend.

The role of the Hearing Advisor includes:

1. Assisting the student in understanding how the hearing will proceed.
2. Assisting the student with understanding the resolution process.
3. Attending the hearing (administrative, Board, admitted responsibility) if the student prefers and selects a time within the Hearing Advisor’s availability.
4. Providing emotional support before, during, and after a hearing.
5. At no time is the Hearing Advisor permitted to address the Board or Hearing Administrator directly or communicate on behalf of the student.

## **DESCRIPTION OF ADMINISTRATIVE HEARINGS**

When the severity of the alleged violation(s) could result in sanctions of written warning, disciplinary probation, or deferred suspension, or in certain other circumstances identified in the Code, involved students will receive a hearing notice requesting their attendance at an administrative hearing.

### ***Notification***

The administrative hearing notice will be sent to students via their university email account. This notice will provide them with the date and location of the incident; the complainant and/or reporting party (where permitted by law and university policy); the alleged violation(s); and the date, time, and location of the hearing.

### ***The Hearing***

An administrative hearing is a one-on-one meeting between the student and Hearing Administrator to discuss the alleged violation(s). Third parties including but not limited to witnesses, lawyers, parents, guardians, and friends are not permitted to attend an administrative hearing. Hearing Advisors may attend at the request of the student. During the hearing, the student provides their account of the incident, the Hearing Administrator presents the student with the report and other available documentation (from which information about or identifying others may be redacted), and asks questions to clarify or identify missing information. In addition, the student can present written documentation, including witness statements, at the administrative hearing for the Hearing Administrator’s review. After the presentation of information, the student may suspend the administrative hearing for a brief and agreed-upon amount of time. After the information has been gathered and the hearing concludes, the Hearing Administrator will review the information to determine if a violation of the Code occurred based on a preponderance of the evidence. If the Hearing Administrator determines that a student violated the Code, the student will be found responsible, and sanctions will be imposed.

### ***Failure to Appear***

If a student fails to appear for the scheduled meeting, the Hearing Administrator has the option to dismiss the charges; set a new hearing date; or make a decision and impose sanctions, if appropriate, based on the information available.

### ***The Decision Letter***

Charged students will receive a decision letter via their university email account that includes the rationale for the finding(s), sanctions (if applicable), and information on the appeal process (if applicable). In certain circumstances, other parties or members of the university community may also be informed of the decision to the extent permitted by law and university policy. Unless otherwise

noted in a student's records, the university reserves the right to notify a student's parents where permitted by university policy and applicable law.

#### **DESCRIPTION OF STUDENT CONDUCT BOARD HEARINGS**

When the severity of the alleged violation(s) could result in sanctions of suspension or expulsion, or if the facts of the incident are so complex that an administrative hearing is not appropriate, involved students will receive a hearing notice requesting their attendance at a prehearing, which precedes a Board hearing. In a Board hearing, the complainant and charged student come before a panel of three or five trained Board members to provide their account of the incident, answer questions, and provide information relevant to their case.

##### ***Notification***

A prehearing meeting notice is sent to the student at their university email account. This notice will provide them with the date and location of the incident; the complainant and/or reporting party (where permitted by law and university policy); the alleged violation(s); and the date, time, and location of the prehearing meeting.

##### ***The PreHearing***

The prehearing meeting is a one-on-one meeting between the student and Hearing Administrator to:

- Review the incident and written documentation (from which information about or identifying others may be redacted) that forms the basis of the complaint
- Explain the charges filed against the student
- Review the Board hearing process and its possible outcomes

In addition, students will have the option to review a list of current Board members and request the exclusion of potential Board members from the hearing panel. An explanation for this request must be supplied by the student and will be reviewed by the Hearing Administrator, who has discretion to resolve the request based on relevant considerations such as the reasons for the request and the interests of fairness and efficiency.

Third parties including but not limited to witnesses, lawyers, parents, guardians, and friends are not permitted to attend the prehearing meeting. Hearing Advisors may attend at the request of the student.

During the prehearing meeting, the charged student can either accept responsibility or contest responsibility for the charges. Upon request, a charged student can delay this decision for no more than two business days after the prehearing meeting. Students should note that accepting or contesting responsibility does not necessarily lessen or increase the sanctions that could be imposed.

- Accept responsibility—Students who accept responsibility for all charges proceed to an admitted responsibility meeting, scheduled for a later date. During the admitted responsibility meeting, the Hearing Administrator presents the case to at least two members of the Board who will ask questions to determine the most appropriate sanctions. The student may provide a verbal statement as well as additional written documentation to the Board.
- Contest responsibility—Students who contest responsibility for at least one of the charges proceed to a Board hearing, scheduled for a later date. Students will have an opportunity to clarify which charges they are contesting or accepting during the introductory statements of the hearing.

OSCCR reserves the right to refer all students from the same incident to a Board hearing for a resolution, regardless of an individual student's preference regarding acceptance or contesting of responsibility.

##### ***Preparing for the Student Conduct Board Hearing***

Attendance at hearings is limited to parties involved and university officials as deemed necessary by the Board and/or by OSCCR. Members of the Northeastern University Police Department or other law enforcement agency may be present at hearings. Attorneys, parents, or guardians are not permitted in Board hearings unless given express permission by OSCCR. Hearing Advisors may attend at the request of the student.

Written documentation—All parties involved have the opportunity to submit written documentation for the Board to review no later than two business days prior to the hearing.

Witnesses—Witnesses who have direct information regarding the incident may be presented by the complainant or the charged student, provided that the witnesses are identified in a list submitted to OSCCR two business days prior to the hearing. OSCCR staff may issue a written request requiring the appearance of an individual before the Board if it is determined that the person's appearance is likely to provide important information for the Board regarding a student's case.

Failure to appear—if the complainant, charged student, or witness(es) fail to appear at the scheduled hearing, the Board or hearing administrator may dismiss the action; set a new hearing date; or continue the hearing without that party present and determine the finding and impose sanctions, if appropriate, based on available information.

##### ***Information Regarding the Student Conduct Board Hearing***

1. The Board typically consists of three or five students representing undergraduate, graduate, online, law, and/or professional studies students. In cases involving graduate and professional studies students, a simple majority of the Board members will be

graduate and/or professional studies students. Where deemed appropriate at the discretion of the director of OSCCR or designee, a Board hearing may instead proceed before a panel composed of three members of the OSCCR staff.

2. The chair will typically be a student and voting member of the Board whose responsibilities during the hearing will be to act as presiding officer at hearings and in all voting procedures.
3. A Hearing Administrator from OSCCR will be present during the hearing and all deliberations to provide information on applicable university policy and procedures. The Hearing Administrator does not vote or represent either party.
4. Board hearings are audio or video recorded for the purpose of appeals only. Parties to appeals may request to listen to the recording of the hearing in the OSCCR. Recordings are not to be removed from the OSCCR and are destroyed upon completion of the appeal process. Recordings do not become part of any student's record or any conduct file maintained by OSCCR.
5. Determinations of responsibility are made based on a preponderance of the evidence, or a "more-likely-than-not" standard, as determined by simple majority vote by the Board.
6. All records of a case will be treated as confidential and disclosed only to the extent permitted under applicable law and university policy.
7. All decisions made by a Board are subject to final approval or modification by the senior vice chancellor for student life, or designee.

#### ***Presentation of Information***

1. Complainant's opening statement and perspective (the complainant is the individual(s) or the office affected by or representing the complaint issued to OSCCR).
2. Charged student's opening statement and perspective (a charged student is the individual(s) charged with a violation of the Code).
3. Questioning of complainant (charged student and SCB members).
4. Questioning of charged student (complainant and SCB members).
5. Statements from complainant's witnesses.
6. Questioning of complainant's witnesses (complainant, charged student, and Board members).
7. Statements from charged student's witnesses.
8. Questioning of charged student's witnesses (charged student, complainant, and Board members).
9. Scheduled break to attend to personal needs and prepare for final statements.
10. Final questions from the Board.
11. Complainant's closing statement.
12. Charged student's closing statement, including any statement as to mitigating circumstances were the student to be found responsible.
13. Complainant and charged student are excused so the Board can engage in closed-door deliberation and sanctioning, if necessary.
14. The Board may ask questions at any time during the hearing.

#### ***The Decision Letter***

After the Board makes a determination and applies any appropriate sanctions, the charged student will receive a decision letter. The letter will include the rationale for the finding(s), sanction(s) (if applicable), and information on the appeal process (if applicable). OSCCR shall make reasonable efforts to issue the decision letter within 10–15 business days of the hearing. In certain circumstances, other parties or members of the university community may also be informed of the decision to the extent permitted by law and university policy. Unless otherwise noted, the university reserves the right to notify a student's parents where permitted by university policy and applicable law.

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## **Procedures for Student Appeals**

Students have five business days from the date of their decision letter to appeal the decision of either the Hearing Administrator or the Board.

All conduct hearing appeals will be heard by the Appeals Board, which consists of three voting members: one representative from Academic Affairs, one representative from Student Life, and a trained student representative.

The director of OSCCR, or designee, will serve as an advisor of the Appeals Board. When a current participant of a Global Experience Office program or a student organization files an appeal, a staff member of those respective programs will join the Appeals Board.

Appeals must be made in writing using the electronic Appeal Request form and must demonstrate one of the following grounds for appeal:

Procedural error—The student asserts a procedural error impaired their right to a fair opportunity to be heard.

New information—Information has arisen that could not reasonably have been made available during the original hearing and may have been sufficient to alter the Board/Hearing Administrator's decision.

Review of sanctions—The student requests a review of the imposed sanction(s), citing undue hardship caused by sanctioning or individual extraordinary circumstances.

The appeals process is primarily a paper process and will not involve a meeting with the charged student or other persons unless requested by the Appeals Board.

The Appeals Board will review the electronic appeal submitted by the appealing party, the documentation from the original case, and any other information deemed necessary by OSCCR. The audio or video recording of the original hearing (in the case of Board hearings) will be made available to the Appeals Board.

**PLEASE NOTE:** The submission of an Appeal Request form will not stay the effect of sanctions imposed by the Hearing Administrator or the Board/Title IX/Sexual and Gender-Based Harassment Board. The Appeal Request form may request that sanctions imposed be stayed, or modified, pending the determination of the appeal, and the reasons for such request are to be set forth within the Appeal Request form. The senior vice chancellor for student life, or their designee, at their discretion may suspend, stay, or modify sanctions imposed, subject to such conditions as they may deem appropriate.

The Appeals Board will take one of the following actions:

- Concur with original decision.
- Refer the matter to the appropriate hearing body if based on a procedural error. In this case, the entire case will be reheard, as if it had not been heard before.
- Refer the matter back to the original hearing body if based on the grounds of new information. The original body; complainant; charged student; and, if required, witnesses, will be reconvened to review only the new information. The hearing body will then render a decision considering the new information.
- Mitigate the sanction. Students should understand that this option is exercised only in rare circumstances. The university reserves the right to take any action necessary to corroborate the student's statements.

All decisions of the Appeals Board may be recommended to the senior vice chancellor for student life, or designee, for final approval.

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## Standards of Conduct

Potential student conduct charges are listed below. Students are required to be familiar with applicable standards, policies, and regulations, as well as with all university, campus, program, and departmental requirements, and must comply with them. Violations of any of these standards will be handled in accordance with the appropriate university procedure.

*The use and/or abuse of alcohol and/or drugs will not be considered a mitigating circumstance for any violation of the Code. Rather, individuals may be additionally charged with the appropriate alcohol or drug violation.* For information regarding standards of conduct related to sex-based harassment and misconduct, including the definition of consent and the definitions of prohibited offenses, please refer to the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>).

Violations are listed in alphabetical order; the order of violations is not indicative of the seriousness of each violation. Repeated violations, multiple violations, or the severity of the misconduct may heighten the university's response, which could include suspension or expulsion from the university and/or cancellation of the Residence Hall and Dining License Agreement.

Where permitted by applicable law and university policy, the university reserves the right to notify parents when a student has been referred to OSCCR.

### ACADEMIC INTEGRITY

As defined in the Academic Integrity Policy (p. 155).

### AIDING AND ABETTING

Knowingly assisting with or cooperating in an act or action that violates the Code. A student may be held responsible as though the student were a direct participant in the violation, even if information indicates the student was not directly involved in the perpetration of the violation.

### ALCOHOL, MARIJUANA, OTHER DRUGS, AND MEDICAL AMNESTY

The university expects that all of its students, whether on or off campus, abide by the law and university regulations concerning alcohol and drug use.

#### *Alcohol*

1. A person under the legal drinking age as defined by local law is prohibited from being in the presence of alcoholic beverages in the residence halls and housing provided and/or arranged by Northeastern, with the following exception: An individual under the legal drinking age who has a roommate of legal drinking age may be in the presence of an open container of alcohol in the room only if the roommate of legal drinking age is also present. Non-roommates who are under the legal drinking age may not be in the room when alcohol is being consumed by the of-age roommate.
2. A person under the legal drinking age is prohibited from possessing empty alcohol containers.

3. For non-university-sponsored events at which alcohol will be served or consumed, no postings, announcements, promotions, or ticket sales may be made, placed, or distributed on university-owned or -leased property.
4. On-campus possession of a keg, beer ball, alcohol by the case, other central sources of alcoholic beverages, or other unauthorized quantities of alcohol is not permitted. Personal possession of alcoholic beverages is limited to one 12-pack of beer (144 ounces/4.26 liters) OR one-half gallon (64 ounces/1.89 liters) of wine OR one pint (16 ounces/470 milliliters) of hard liquor.
5. Possession or consumption of alcoholic beverages in locations or under conditions prohibited by university policy or by law:
  - a. A person must be of legal drinking age to possess or consume alcoholic beverages.
  - b. An individual of legal drinking age may possess and/or consume alcohol only in the student's residence hall room or in the residence hall room of another resident who is of legal drinking age and present in the room, provided alcohol is permitted in that residence hall for students of legal drinking age.
  - c. Prohibited locations include but are not limited to hallways, lobbies, lounges, stairwells, classrooms, studios, technical facilities, auditoriums, bathrooms, outdoor areas, vehicles, or any other public areas without authorization.
6. The possession or use of items that encourage heavy alcohol consumption is prohibited (examples could include alcohol funnels, AWOL or Alcohol Without Liquid, generators or vaporizers, BORGs, etc.), regardless of age.
7. Providing alcohol to anyone under the legal drinking age and/or allowing anyone under the legal drinking age to consume alcohol in on- or off-campus residences.
8. Distribution, sale, or manufacture of alcohol.
  - a. Manufacturing alcohol on university-owned or -leased property.
  - b. Selling alcohol without a liquor license, including but not limited to the sale of cups and/or any other form of container for the distribution of alcohol.
  - c. Distributing alcohol includes providing a central source or large quantity of alcohol.

### **Drugs**

1. Knowingly being in the presence of illegal drugs.
2. Possession or consumption of illegal drugs (including marijuana), salvia divinorum, prescription medications belonging to another individual or over-the-counter substances, nitrous oxide, or other available substances to "get high" or induce a mind-altering state.
3. Possession, use, manufacture, distribution, or sale of drug paraphernalia or other items used in preparing or consuming illegal drugs (including marijuana).
4. Promotion of illegal drugs (including marijuana).
5. Providing or sharing drugs.
6. Distribution, sale, or manufacture of drugs (marijuana, mushrooms, prescription drugs, etc.).
  - a. Manufacturing or cultivation of drugs, on or off campus.
  - b. Sale or distribution of drugs or intention of sale or distribution.

### **Medical Amnesty**

In cases of a drug or alcohol emergency, the primary concern is the health and safety of the individual(s) involved. Students/organizations are strongly encouraged to call the appropriate campus safety or emergency resources for medical assistance for themselves or for another student who they observe to be or feel is dangerously intoxicated/under the influence of drugs. If a student/organization calls on behalf of another student, that student/organization is required to remain with the student experiencing the emergency until medical assistance arrives. Neither the caller nor student requiring medical assistance for an alcohol or other drug-related emergency will be subject to university disciplinary action for the violation of possession or consumption of alcohol or drugs. This policy shall extend to the parties actively involved in proactively calling for medical assistance and is determined at the discretion of the director of OSCCR.

The student requiring medical assistance (and possibly the referring student(s)/organization) will receive medical amnesty and will have a confidential "check-in" meeting with a staff member from the Office of Prevention and Education at Northeastern. The student may also be contacted by various campus departments (e.g., WeCare and Northeastern University Police Department) for an optional follow-up conversation regarding the incident. As long as the student(s)/organization complies with all directives, there will be no disciplinary action taken related to the violation of possession or consumption of alcohol or drugs and no disciplinary record of the incident kept in the OSCCR. This policy applies only to those students or organizations who seek emergency medical assistance in connection with an alcohol or drug-related medical emergency and does not apply to individuals experiencing an alcohol or drug-related medical emergency who are found by university employees (e.g., Northeastern University Police, faculty, administrative staff, or residence hall staff) or where the reporting student(s)/organization did not stay with them.

The Medical Amnesty Policy is not intended to shield or protect those students or organizations that repeatedly violate the Code. When repeated instances of drug or alcohol emergencies occur, the university reserves the right to take disciplinary action on a case-by-case basis regardless of the manner in which the incident was reported.

Medical amnesty applies only to alcohol or other drug-related emergencies, but it does not apply to other conduct violations such as but not limited to assault, property damage, or distribution of illicit substances. If other violations occur, then a student may face disciplinary charges for those violations. The use or abuse of alcohol or drugs is not considered a mitigating circumstance for any

other violations of the Code. Medical amnesty applies only to the university response to a medical emergency. The Medical Amnesty Policy applies only to OSCCR proceedings and does not affect any separate law enforcement actions or criminal proceedings.

### **BIAS-RELATED INCIDENTS**

Conduct prohibited by this Code may include but is not limited to harassment, bullying, abuse of others, disorderly conduct, and vandalism that is motivated in whole or part by prejudice toward an individual's or group's real or perceived race, color, religion, religious creed, genetics, sex, gender, gender identity, gender expression, sexual orientation, age, national origin, ancestry, veteran status, or disability.

### **BREAKING AND ENTERING**

Attempted, actual, or forcible access to property.

### **BULLYING**

A verbal, electronic, or physical act or gesture or the repeated use of written, verbal, or electronic expression or communication or any combination thereof that causes or is intended to cause physical, psychological, and/or emotional harm to another person or damage to property; places a university community member in reasonable fear of harm or damage to property; or creates a hostile, threatening, intimidating, humiliating, or abusive environment for a university community member or substantially interferes with academic performance, opportunities, or benefits. For purposes of this section, bullying may include but is not limited to social exclusion or isolation, humiliation or degradation, threats, intimidation, harassment, stalking, theft and/or damage/destruction of property, or the perpetuation of any of the conduct listed in this section by inciting, soliciting, or coercing others to demean, embarrass, humiliate, or cause emotional, psychological, or physical harm to a member of the university community.

### **DANGEROUS WEAPONS**

Possession or use of items that could be used or are used to threaten another individual with physical harm in violation of the university's Policy on Weapons on Campus (<https://policies.northeastern.edu/policy604/>). Those items include but are not limited to nunchakus (karate sticks), switchblades, knives, fake guns, tasers, BB guns, fireworks, ammunition, explosive devices, or firearms, except under official supervision as part of a recognized student activity.

### **DISORDERLY CONDUCT**

Conduct that is disorderly or disruptive in nature and negatively affects the campus community, the neighborhood, and/or community members.

### **DISRUPTIVE GATHERINGS**

Hosting or attending a disruptive gathering, whether on or off campus. Examples include but are not limited to gatherings that result in a noise complaint and/or police response, those that are disruptive to neighbors in any way, and/or excessive attendance beyond what is safe and/or reasonable.

### **DOXING**

Publishing or distributing personal identifying information about another person with intent to place the other person in reasonable fear of harm to themselves or their family or for the purpose of causing or encouraging unwanted physical contact, injury, or harassment of the person by others.

### **ENDANGERING BEHAVIOR**

Conduct demonstrating that the student constitutes a threat to self or others, or to the proper functioning of the university, including but not limited to threats, excessive consumption of drugs and/or alcohol, intoxication, bypassing security measures, dropping items from a window, and using any item to cause fear and intimidation and/or injury to another.

### **EXCESSIVE CONSUMPTION**

Excessive consumption of alcohol is prohibited regardless of age. Being under the influence of and/or the abuse of drugs is prohibited.

Behavioral symptoms frequently associated with excessive consumption or intoxication may include but are not limited to impaired motor-skill coordination, difficulty communicating, vomiting, glazed/red eyes, the smell of alcohol on one's breath, verbal and/or physical aggressiveness, destructive and/or disruptive behavior, and engaging in any behavior that may endanger oneself or others.

### **FAILURE TO COMPLY**

1 . Failure to comply with or violation of the terms of an imposed disciplinary sanction.

2 . Failure to follow the reasonable directions of university officials (including Northeastern University Police Department officers and faculty and staff at Northeastern), law enforcement agents, cooperative work assignment employers, or officials at other colleges and universities that are necessary for the proper conduct of the university and university community.

### **FAILURE TO PRODUCE NORTHEASTERN STUDENT IDENTIFICATION**

All students must identify themselves by showing a Northeastern University Husky Card upon request by any university personnel or authorized personnel, including Northeastern University Police Department personnel. The Husky Card is the official identification card at Northeastern and is issued to all students. Students wearing a mask may be asked to adjust their mask for identity verification.

### **FIRE SAFETY**

Breaching campus fire safety or security through:

1. Setting a fire (including charring, burning, lighting of papers, or any other act that could cause a fire), making a bomb threat, causing or creating a false alarm, or other such intentional or reckless conduct that causes harm or reasonable fear of harm to persons or property.
2. Misusing, tampering, or damaging fire safety equipment (including alarm systems, alarmed fire safety doors, smoke detectors, or fire extinguishers).
3. Failure to vacate university buildings during or after a fire alarm.
4. Entering or reentering a building during a fire alarm.

**FORGERY**

Falsification, alteration, or misuse of documents or records (including but not limited to parking permits, software, computer databases and/or systems, and/or email).

**GAMBLING**

Unlawful engaging in, playing, operating, or assisting in operating a game of chance for money (or some other stake) or the sale of lottery or raffle tickets, as prohibited by applicable law.

**HARASSMENT**

Repeated and/or continuing unwanted behavior, coercion, or intimidation of an individual or group, either directly or indirectly.

**HAZING**

Violation of the university's Policy Prohibiting Hazing (<https://policies.northeastern.edu/policy606/>), or engaging in hazing as defined by Chapter 269 of the Massachusetts General Laws or as follows: any action taken or situation created, whether voluntary or involuntary, for the purpose of initiation, admission into, affiliation with, or as a condition for continued membership in a group or organization that endangers the mental or physical health or safety of a student; creates risk of injury; causes mental or physical fatigue or distress, discomfort, embarrassment, harassment, ridicule, or intimidation; causes damage to or destruction of property; or which is a violation of law, university policy, or the Code. Such activities include but are not limited to striking another student by hand or with any instrument; requiring or advocating alcohol or other drug use; late sessions/meetings that interfere with academic activities; tattooing, branding, or piercing; physical or psychological shocks; wearing of apparel in public that is embarrassing, humiliating, or degrading; or games/activities causing or resulting in fatigue, sleep deprivation, mental distress, panic, embarrassment, or humiliation. Agreeing to maintain a specific GPA, comply with a dress code for a team/organizational function, participate in volunteer community service, participate in a team/organizational trip, take an oath, or sign a contract of standards is not considered hazing.

**INAPPROPRIATE IDENTIFICATION**

- 1 . The manufacturing, production, and/or distribution of any fake identification.
- 2 . Use of identification other than your own or possession of a false or altered ID.
- 3 . Representing yourself as someone other than who you are.
- 4 . Duplicating, lending, or borrowing of any official identification including but not limited to Husky Cards, student identification numbers, and driver's licenses.
- 5 . Impersonating a university official.

**MISREPRESENTATION OF INFORMATION**

Falsification, distortion, or misrepresentation of information to the university or its officials (including Northeastern University Police Department officers and faculty and staff at Northeastern), law enforcement agents, cooperative work assignment employers, or officials at other colleges and universities that is intended to mislead in investigations or administrative processes or could adversely affect the mission or operations of the university.

**MISUSE OF ELECTRONIC RESOURCES**

Misuse of electronic systems or methods (for example, email "hacking") to steal, misrepresent, threaten, harass, or bully (including online aggression or cyberbullying) or violations of the Policy on Appropriate Use of Computer and Network Resources (<https://policies.northeastern.edu/policy700/>) and/or any other computer or system use restrictions.

**NOISE**

Disturbances in residence halls, on campus, or in neighborhoods caused by a loud or disruptive sound.

**PHYSICAL ABUSE**

Physical abuse of others, including but not limited to fights and/or injury caused by endangering behavior.

**RETALIATION**

Any intentional or attempted act that results in an adverse or negative effect on a person who in good faith makes a report, serves as a witness, or participates in an investigation or hearing regarding a violation of the Code or other university policy.

**RIOTING**

Inciting, participating in, or encouraging any disturbance for purposes of committing any action that presents a clear and present danger to self or others, causes physical harm to persons, or vandalizes or destroys property.

**SMOKING**

Smoking of any tobacco products is prohibited at Northeastern. Refer to the university Policy on Tobacco and Smoke-Free Campus (<https://policies.northeastern.edu/policy607/>).

**THEFT**

- 1 . The taking of property not owned by oneself.
- 2 . Attempted or actual theft of property.
- 3 . Attempted or actual theft of identity or services.
- 4 . The unauthorized use of ATM, phone, or credit cards; checks; Northeastern ID cards; or computer systems (including violation of the Policy on Appropriate Use of Computer and Network Resources (<https://policies.northeastern.edu/policy700/>)).

**UNAUTHORIZED ACCESS OR USE**

Unauthorized access or entry to, into, or onto any property owned or operated by the university or any private or restricted property.

**UNAUTHORIZED USE/POSSESSION OF OTHER'S PROPERTY**

Unauthorized use or possession of another's property.

**UNAUTHORIZED USE OF UNIVERSITY IDENTIFICATION MARKS**

Unauthorized use of the university's name, or other identifying mark, including but not limited to postings, letterhead, websites, pamphlets, social media, etc. Please refer to the university Policy on Endorsements and Use of University Identifiers (<https://policies.northeastern.edu/policy116/>).

**UNIVERSITY GUEST POLICY**

Failure to control guests on campus or at university-sponsored events. Refer to the Residence Hall and Dining License Agreement (<https://housing.northeastern.edu/license-agreement/>) and/or Guide to Residence Hall Living (<https://housing.northeastern.edu/policies-and-publications/>) for specific regulations regarding guests in residence halls. If a guest violates university policy, the host may be held accountable for actions of the guest. The level of sanctioning for the host may be dependent upon the nature of the incident(s).

**VANDALISM**

Destruction or defacement of public or private property.

**VIOLATION OF CENTER FOR SPIRITUALITY, DIALOGUE, AND SERVICE GUIDELINES**

Failure to abide by the Guidelines and Policies set forth by the Center for Spirituality, Dialogue, and Service (<https://spirituallife.northeastern.edu/student-groups/>).

**VIOLATION OF CENTER FOR STUDENT INVOLVEMENT GUIDELINES**

Failure to abide by the rules and regulations set forth by the Center for Student Involvement and/or included in the Student Organization Handbook.

**VIOLATION OF GUIDE TO RESIDENCE HALL LIVING**

Failure to abide by the rules and regulations set forth for all residential students and stated in the Guide to Residence Hall Living (<https://housing.northeastern.edu/policies-and-publications/>).

**VIOLATION OF LAW**

Any action or behavior that violates federal, state, or local law.

**VIOLATION OF PROFESSIONAL CONDUCT IN DEGREE PROGRAM**

Failure to fulfill the guidelines and/or expectations of an academic degree program. Examples include but are not limited to failing to complete an internship, acting in an unprofessional manner (as defined by the degree program), etc.

**VIOLATION OF THE N.U.IN PROGRAM POLICIES**

Failure to abide by the rules and regulations set forth for all N.U.in participants and/or established in conjunction with N.U.in partner institutions.

**VIOLATION OF UNIVERSITY POLICIES**

Violation of any university policy, rule, or regulation published in hard copy or available electronically on the University Policies (<https://policies.northeastern.edu>) website.

## Sanctions

Sanctions are imposed to strengthen learning and assist students/organizations in adopting behaviors in order to avoid repeat violations.

In determining appropriate sanctions, Hearing Administrators and/or boards look at the totality of the incident(s)/situation and its impact on the community rather than looking at individual violations. In addition, they consider/weigh the impact of the following:

- 1 . Nature of the violation(s)—what happened?
- 2 . Severity of the impact caused (damage, injury, or harm, etc.) from this incident.
- 3 . Charged student's student conduct record, which could increase the severity of sanctions imposed for incident in question.
- 4 . Mitigating circumstances.
- 5 . Aggravating circumstances, which may include bias motivation.

Once these factors have been taken into consideration, Hearing Administrators and/or boards will look to impose at least one inactive sanction and at least one active sanction. In many instances, more than one active sanction will be imposed. A list of possible sanctions follows. Hearing administrators and/or boards reserve the right to create active sanctions not included on this list if they determine that the sanction better addresses the concern and provides an appropriate opportunity for learning.

*Inactive:* May affect students' good standing with the university and may not require any sort of action on the part of the student.

1. Expulsion is the permanent separation of the student from the university. Students are permanently banned from entering all university property and prohibited from participating in any university-sponsored activities. A permanent notation, "Withdrawn Expelled (WE)," will appear on the student's transcript.
2. Suspension is the separation of the student from the university for a specified period of time, after which the student is eligible to return. Conditions for readmission may be specified. During the period of suspension, students are banned from entering all university property, may not live in university housing, and are prohibited from participating in any university-sponsored activities. Students are expected to adhere to all university policies while on suspension and will be held accountable for any violations during the period of suspension. Students will not be granted credit for any academic work during the period of suspension (including a cooperative work assignment). A student will continue on disciplinary probation for a specified period of time following the completion of suspension.
3. Deferred suspension is the most serious formal warning for violation of university rules/regulations that affects the student's good standing with the university. Students on deferred suspension may be limited in their ability to attend university programs, including those outside the country, during the period of deferred suspension. Deferred suspension is for a designated period of time. If the student is found responsible for violating any additional university policy, rule, or regulation during the period of deferred suspension, suspension may become effective, and the student may be subject to additional sanctions for the additional violation. Restrictions and/or conditions regarding participation in university-sponsored activities may be imposed. Students on deferred suspension may be members of organizations but may not hold any elected or appointed position in any recognized student organization or group, represent the student body on any university committee, or serve the university in other leadership positions. A student will continue on disciplinary probation for a specified period of time following the completion of deferred suspension.
4. Disciplinary probation is a formal warning for violation of university policies, rules, or regulations. Probation is for a designated period of time and includes the likelihood of imposing more severe sanctions if the student is found to have violated any university policy, rule, or regulation during the probation period.
5. Letter of warning is a formal warning for violation of university policies, rules, or regulations and cautions students that continuation or repetition of prohibited conduct may result in more serious sanctions.
6. Cancellation of the Residence Hall and Dining License Agreement results in the separation of the student from university residence facilities either permanently or temporarily. Upon the cancellation of the agreement, the student is banned from entering all university residence facilities during the specified period of separation. *PLEASE NOTE:* Students required to leave the residence halls and/or the campus as a result of disciplinary action will not be eligible for a refund of tuition, housing, board, or other charges regardless of date of removal.
7. Loss of privileges and restriction on activities is the loss and/or withdrawal of services or privileges as a student or member of the community or the loss of the privilege to participate in an activity or event. Examples include but are not limited to restriction from holding positions of leadership in university-recognized student groups, clubs, and/or organizations or from being hired by programs/departments to serve in leadership roles; restriction from attendance at university events or activities, including but not limited to campus programs, commencement, sporting events, etc.; restriction from the use of university resources; restriction of entry or access to particular locations, premises, or events; restriction on ability to study abroad, including but not limited to traditional study-abroad programs, Dialogues of Civilization, mobility programs, co-op participation, etc.
8. Restriction of guest privileges results in students' privileges with respect to hosting guests on campus, including in a residential facility, may be restricted or revoked for a specified period of time.

9. Other appropriate and alternative outcome information may include but is not limited to interim action pending a hearing and/or investigation, assignment of educational projects, referral to other offices or departments for ongoing guidance and support, specialized restorative projects, and additional restriction of university privileges including but not limited to the restriction from university facilities or programs. These sanctions will not be noted on a student's transcript.
10. Northeastern reserves the right to delay the awarding of a degree, certificate, badge, or other credential pending the resolution of the student conduct process.
11. Northeastern reserves the right to withhold the awarding of any degree for academic and nonacademic misconduct.
12. Northeastern reserves the right, at its discretion, to revoke a degree.

*Active:* Requires student to take action.

1. Loss of membership in teams, clubs, and/or officially recognized organizations.
2. Loss of ability to hold any elected or appointed positions in any recognized student organization or group, represent the student body on any university committee, or serve the university in other leadership positions. Students may be members of organizations and may run for office while on this status but may not take office while it is in effect.
3. Loss of access to university buildings, facilities, or resources for a specified period of time or permanently.
4. Mandated service.
5. Restitution, which requires the student to make payment to the university or to specified individuals, groups, or organizations for costs incurred as a result of violation of university rules/regulations.
6. Loss of guest privileges on campus or in residence halls.
7. Submission of letter of apology to complainant/affected party.
8. Counseling evaluation.
9. Educational sanction, which may include but is not limited to attending a program, developing a program, and/or writing a paper. Students may be charged a fee to attend an educational program.
10. Fines for alcohol and drug cases. At the student's request, mandated service may be completed in lieu of paying the fine.

The university also reserves the right to sanction any student who is found responsible, pleads no contest, or is found guilty in a court of law for a violation of law. In these instances, disciplinary action will be administered through OSCCR and will not be processed by the Board.

In addition, students should review their financial aid and scholarship information to get clarification on those policies.

While the Hearing Administrator and/or the Board have discretion to impose sanctions they determine most appropriate based on the considerations described above, the Code provides sanctioning guidelines for drug and alcohol violations. The sanctions set forth below provide Hearing Administrators with a starting point for sanctioning cases involving alcohol and/or drugs. Depending on the information obtained through the hearing and the severity of the harm, the imposed sanctions may be enhanced or lessened. Students found responsible for violating the Code risk the cancellation of their Residence Hall License and Dining Agreement.

#### ***Sanction Guidelines for Possession/Consumption of Alcohol***

First violation:

- Disciplinary probation
- Mandatory completion of an alcohol education program
- Fine of \$100 or 10 hours mandated service

Second violation:

- Deferred suspension from the university
- Mandatory completion of an alcohol education program
- Fine of \$200 or 20 hours mandated service

Third violation:

- Suspension from the university
- Mandatory alcohol counseling to be completed off campus

#### ***Sanction Guidelines for Possession/Consumption of Marijuana***

First violation:

- Disciplinary probation
- Mandatory completion of a marijuana education program
- Fine of \$100 or 10 hours mandated service

Second violation:

- Deferred suspension from the university
- Mandatory completion of a marijuana education program
- Fine of \$200 or 20 hours mandated service

Third violation:

- Suspension from the university
- Mandatory drug counseling to be completed off campus

#### ***Sanction Guidelines for Possession/Consumption of Other Drugs***

First violation:

- Deferred suspension from the university
- Mandatory completion of a drug education program
- Fine of \$200 or 20 hours mandated service

Second violation:

- Suspension from the university
- Mandatory drug counseling to be completed off campus

A letter may be sent home to a parent/legal guardian when a student is found to have violated laws or policies concerning the use or possession of alcohol or controlled substances.

#### ***Parent/Guardian Notification***

Northeastern reserves the right to notify parent(s)/ guardian(s) about aspects of student conduct matters to the extent permitted by university policy and applicable law. The university may notify parent(s)/guardian(s) in matters including, without limitation, certain cases involving alcohol or drugs and matters that pose a threat to the health or safety of the student and/or other individuals.

#### ***Interim Suspension***

The senior vice chancellor for student life, or their designee, may impose an interim suspension on a student if sufficient facts indicate that the student presents a threat to the university community. In most instances, a student who has an interim suspension from the university will be immediately banned from the university community. Interim suspension may include restrictions on class attendance, access into residence halls, and/or access to or use of university-owned or -operated property. The senior vice chancellor for student life, or their designee, may remove the interim suspension.

Students who have an interim suspension from the university will have a hold placed on their record and will need to make advance arrangements with OSCCR for approval any time they may need to be on campus to take care of university-related business during the period of the interim suspension.

In cases involving interim suspension, efforts will be made, if practicable, to conclude the hearing and obtain a decision on the charges within 10 business days after the interim suspension was imposed.

#### ***Other Interim Action***

If upon review of a report Northeastern determines that an individual(s) is considered an imminent threat to the community, or when advisable to protect the physical, social, or emotional well-being of the university community, the senior vice chancellor of student life, or designee, may invoke interim administrative measures that can include but are not limited to loss of privileges and restrictions on activities, immediate residence hall relocation or suspension, and any other action deemed necessary to support students and/or this campus community or university community pending the outcome of the conduct process.

#### ***No Contact Order***

When the university determines the severity of an incident rises to the level where continued contact between the involved parties could lead to further incidents and/or the creation of an unhealthy, unsafe, and/or hostile environment, OSCCR may impose a no contact order on the parties involved with the incident. Communication of the order will be made via email to the student's Northeastern email account.

#### ***Temporary Measures Administrative Directive***

If a student or student organization is acting in such a way that may prove to be a violation of the Code, the senior vice chancellor for student life, or designee, may issue an administrative directive prohibiting the continuation of such behavior. It is not necessary for there to be current ongoing proceedings or even charges against the student or student organization when an administrative directive is issued.

A designated university administrator may issue an administrative directive, according to the guidelines listed, when harm is deemed to be occurring and immediate action is deemed necessary. OSCCR will enforce the directive.

1. A designated university administrator may issue an administrative directive:
  - a. To prevent a student or student organization from acting in specified ways that may result in violations of the Code. The designated university administrator may also prevent a student or student organization from committing an act that would negatively impact or interfere with OSCCR proceedings or any other similar proceedings.
  - b. To restrain a student or student organization from assuming or exercising privileges granted to them by the university, pending action, until a final judgment can be rendered.
2. In order to receive an administrative directive, the prohibited action must be within the jurisdiction of the administrator, or designee, issuing such an order.
3. The designated administrator determines the date that the administrative directive expires, a period that initially will not exceed 10 days. The 10-day period may be extended, in consultation with the designated administrator's immediate supervisor, or if the restrained party consents to an extension.
4. Administrative directives will specify the reasons for the directive, the act or acts that are prohibited, and the student or organization bound by such directive.

## Maintenance of Student Conduct Records

1. The university will permanently maintain the conduct records of those students separated from Northeastern by suspension or expulsion. A notation will be placed on the transcript of any student expelled from the university. A hold will be placed on the account of any student that withdraws, takes a leave of absence, or becomes inactive prior to the resolution of disciplinary charges. Such hold may not be lifted until the pending charges are resolved.
2. The university will expunge the conduct records of those students who received sanctions other than suspension or expulsion three years after the student's withdrawal or immediately upon their graduation date from Northeastern.
3. Written warnings are maintained in student conduct records as provided above for internal use by OSCCR. The university does not consider such warnings to constitute disciplinary records.
4. Students have the right to submit any documentation in their conduct file to amend a record they believe to be inaccurate or misleading.
5. If Northeastern notes a sanction on a transcript, this notation will not describe the violation or incident that resulted in the sanction. If a student voluntarily takes a leave or withdraws with an OUEC compliance complaint pending against them or a Code violation pending for conduct that reportedly harmed other individual(s) or the community, Northeastern will note the following on the student's transcript: "Voluntarily withdrew [day/month/year], with disciplinary charges pending. This notation does not constitute a finding or admission of responsibility." This notation will remain on the student's transcript until the charge or complaint is resolved.
6. Please refer to the university's privacy information (<https://www.northeastern.edu/privacy-information/>) and Policy on Student Rights Under The Family Educational Rights and Privacy Act (FERPA) (<https://policies.northeastern.edu/policy106/>) for more information regarding the disclosure of student records.

## Interpretation and Application

1. Any question of interpretation or application of the Code shall be referred to the director of OSCCR, or designee.
2. The Code and its related procedures do not preempt or supplant any similar rules and regulations maintained by individual colleges, programs, departments, or offices. For example, student-athletes and members of student organizations must also abide by the policies of the Athletics Department and the Center for Student Involvement, respectively. Any proceedings under such policies may run concurrently with those described herein.
3. Nothing in this handbook limits the university's right to take any action it deems necessary to comply with applicable local, state, and federal law.

## Course Credit Guidelines

### Guidelines for Assigning Credit to Courses

The primary standard for establishing course credit at Northeastern University is the semester/quarter hour, or Carnegie Unit, the standard used by the federal government. One hour of credit is awarded for a lecture/seminar class meeting 50 minutes each week during a 15-week semester or 12-week quarter and also requiring a minimum of two hours of outside preparation each week by the student. An hour of contact time in the rest of the document is based on this 50-minute session.

- 2 semester/quarter hours (100 minutes per week of instruction plus 4–6 hours homework, or equivalent)
- 3 semester/quarter hours (150 minutes per week of instruction plus 6–9 hours homework, or equivalent)
- 4 semester/quarter hours (200 minutes per week of instruction plus 8–12 hours homework, or equivalent)

The Office of the University Registrar (<https://registrar.northeastern.edu/>) maintains the official record for all courses. In the event of error in any publication, the academic record will reflect the correct semester/quarter hours applicable to any degree requirement.

On occasion, course titles change, while the course number remains the same. Despite such title changes, the course is still considered to be the same course. Students who have taken the course under the old title and then take the course again under the new title are considered to have repeated the course.

### **NOTE ABOUT HOMEWORK AND STUDENT PREPARATION FOR CLASS**

The credit hour assumes a set proportion of two hours of student preparation or homework for every hour spent in class. Northeastern wishes to emphasize that the federal government has established this as the minimum amount of work expected, and assigning more work does not in itself justify an increase in the credit value of the course. We also wish to note that there is great variation in the amount of time each student will need to devote to each course or to a specific form of study (e.g., reading, writing, completing problem sets), and, therefore, it is not possible to enforce any exact accounting of student work outside of class.

### **CREDIT ASSIGNMENT PROCESS**

Northeastern uses the Carnegie Unit to determine class meeting time requirements. The actual amount of academic work that goes into a single credit hour is calculated as follows:

- One lecture (taught) or seminar (discussion) credit hour represents one hour per week (50 minutes) of scheduled class/seminar time and two hours of student preparation time.
- One laboratory or studio credit hour represents one hour per week of lecture or discussion time plus one to two hours per week of scheduled supervised or independent work, or a total of three hours in the lab or studio.

### **DEFINED INSTRUCTIONAL METHODS**

- Traditional: meets fully on ground in a physical location with instructor present
- Hybrid: meets majority on ground in a physical location with instructor present with some online instructional component
- Live cast: meets fully on ground in a physical location with the instructor in a different location teaching synchronously and supported by an instructional assistant in the physical location
- Online: meets fully online

### **FULL-TIME AND HALF-TIME EXPERIENCES**

Academic experiences integral to curriculum and requiring registration (but not credit bearing) have the following required hours of participation:

- Full-time experiences: 32–40 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days
- Half-time experiences: 16–31.99 hours per week in a semester for a minimum of 11 weeks or 55 days, or in a quarter for 9 weeks or 45 days (to achieve full-time status, graduate students must take 3 or more academic credits and undergraduate students must take 4 or more academic credits)
- Summer 1 or Summer 2 semester: minimum of 5 weeks or 25 workdays
- Summer quarter: 6 weeks or 30 workdays

International students must confer with the Office of Global Services to determine CPT requirements as appropriate.

### **Course Numbering System**

0001–0999	<b>Orientation and basic</b> No degree credit
<b>Undergraduate</b>	
1000–1999	<b>Introductory level (first year)</b> Survey, foundation, and introductory courses, normally with no prerequisites and designed primarily for students with no prior background
2000–2999	<b>Intermediate level (sophomore/junior year)</b> Normally designed for sophomores and above but in some cases open to freshman majors in the department
3000–3999	<b>Upper-intermediate level (junior year)</b> Designed primarily as courses for juniors; prerequisites are normally required, and these courses are prerequisites for advanced courses
4000–4999	<b>Advanced level (senior year)</b> Designed primarily for juniors and seniors; also includes specialized courses such as research, capstone, and thesis
<b>Graduate</b>	
5000–5999	<b>First-level graduate</b> Courses primarily for graduate students and qualified undergraduate students with permission

6000–6999	<b>Second-level graduate</b>
7000–7999	<b>Third-level graduate</b>
8000–8999	<b>Clinical/research/readings</b>
9000–9999	<b>Includes comprehensive exam preparation</b>
	<b>Doctoral research and dissertation</b>

## Grade Change Policy

If a student has not graduated, a grade can be changed by a course instructor within 12 months of the end of the semester in which the grade was given.

If a student has graduated, or if more than 12 months have elapsed, a grade can only be changed by request of a course instructor with the approval of the college that offers the course.

If more than 24 months have elapsed, grades can no longer be changed.

If a course instructor is not available, course change requests may be initiated by the department or college that offers the course.

Colleges may place additional restrictions on how grades can be changed.

The grade change policy explains when a course instructor may change a student's grade to correct errors. This policy does not apply to incomplete grades or to student-initiated appeals to change grades. In particular, the grade change policy should not be used to allow a student to submit work after the completion of a class.

## Grade Table and GPA

### Grade Table

Grades are officially recorded by letters, evaluated as follows:

Letter Grade	Numerical Equivalent	Explanation
A	4.000	Outstanding achievement
A-	3.667	
B+	3.333	
B	3.000	Good achievement
B-	2.667	
C+	2.333	
C	2.000	Satisfactory achievement
C-	1.667	
D+	1.333	Undergraduate only
D	1.000	Undergraduate only/Poor achievement
D-	0.667	Undergraduate only
F	0.000	Failure
I		Incomplete
IP		In progress
CR		Credit (School of Law only)
HH		High Honor (School of Law only)
H		Honor (School of Law only)
P		Pass (School of Law only)
MP		Marginal Pass (School of Law only)
NE		Not enrolled
NG		Grade not reported by faculty
S		Satisfactory (pass/fail basis; counts toward total degree requirements)
U		Unsatisfactory (pass/fail basis)
X		Incomplete (pass/fail basis)
L		Audit (no credit given)

T	Transfer
W	Course withdrawal

An I, IP, or X grade shows that the student has not completed the course requirements.

The IP grade is intended for courses that extend over several terms. The time restrictions on the incomplete grade do not apply to the IP grade. While the IP grade is left unchanged, it is not included in computing the grade-point average. If the IP grade is never changed, the course does not count toward graduation requirements.

The NG grade is intended for classes with temporary unreported grades. The Office of the Registrar may enter an NG grade code after the grading deadline in accordance with the academic calendar if no grade is entered on the student's record during the instructor grading period. The instructor of record will subsequently resolve the grade to update the student record. See also Grade Change Policy (p. 176).

## Course Comments

The following notations may also appear on the student's transcript:

E	Course excluded from GPA
HON	Honors-level course
I	Course included in GPA

## GPA

Numerical equivalents for scholastic averages are weighted according to the number of hours the course carries. For example, suppose a student receives a grade of B in a course carrying 4 semester hours and a grade of A in a course carrying 1 semester hour. The weightings for these example courses are as follows:

Grade	Numerical Equivalent	Semester Hours	Weight
B	3.000	4	12
A	4.000	1	4
Totals:		5	16

The GPA for both courses would then be the total weight (16) divided by the total semester hours (5), or 3.200. Grades of I, IP, S, U, and X are not included in the calculation of the GPA. See Grade Table (p. 176) for a complete list of grades and numerical equivalents.

## Leaves of Absence and University Withdrawal

Students may request to take the following types of leaves of absence:

- Personal or Academic
- Medical or Emergency
- Military Deployment or Missionary Service

*Students in prematriculation programs, such as Pathway programs (including Global Pathways, Foundation Year, NU Immerse), and Global First Year programs (N.U.in, Global Scholars, London Scholars), do not fall under the leave of absence policy below. Students in these programs with emergent, medical, or personal circumstances that require a conversation about their ability to continue with their program of study should reach out to We Care (<https://we-care.studentlife.northeastern.edu/>) for further guidance.*

## General Leave of Absence Policy

Students who wish to take a leave of absence should complete a request through the Student Hub (<https://me.northeastern.edu>) (or via University Health and Counseling Services for a medical leave of absence, as described below) before the last day to drop without a W in a term. Please consult the Academic Calendar ([https://registrar.northeastern.edu/group/calendar/#\\_ga=222318140315109033061621260160-17152695181613325628](https://registrar.northeastern.edu/group/calendar/#_ga=222318140315109033061621260160-17152695181613325628)) for the last day to drop without a W in the term.

Students can request a leave until the last day to drop with a W in a term but should review the financial implications of withdrawing from courses on the Student Financial Services website (<https://studentfinance.northeastern.edu/policies-procedures/withdrawalleave-of-absence>).

Students can take up to one year of leave.

Any leave of absence type, if approved, is subject to the following conditions:

- International students must make an appointment with the Office of Global Services (<https://international.northeastern.edu/ogs/>) to discuss leave of absence procedures in accordance with federal regulations.
- Students who do not return at the end of the leave will be withdrawn and must contact their college for reentry prior to the term start.

- Students must return to a Northeastern University-sponsored activity that contributes toward the satisfaction of outstanding program requirements, such as registration for academic coursework.
- Students must be considered active in the period for which they are requesting a leave. Students are considered active when they are currently engaged in university-sponsored activity, such as academic coursework and co-op. If a student is withdrawn for personal reasons, the withdrawal can be reversed and a request for a leave of absence can only be processed if it is before the last day to drop without a W in a term. If the student has been administratively withdrawn, a request for leave of absence cannot be considered until the withdrawal is resolved.
- If a leave extends more than six months, students who have taken loans for education expenses may be required to begin repayment of those loans. Students who receive financial aid should meet with a financial aid counselor before going on a leave. Please see Return of Title IV Aid (<https://catalog.northeastern.edu/undergraduate/expenses/financial-aid/>) for the possible financial aid impact of a leave of absence.
- Students in university housing should refer to the Office of Housing and Residential Life for policy information.
- A student's enrollment status cannot include more than one academic year of consecutive nonclass enrollments. Students on leave for more than one year will be withdrawn from the university.
- If a student has taken multiple leaves, resulting in the postponement of expected graduation date of a calendar year, the next leave request will be processed as a withdrawal.
- While on leave, students are not allowed to take classes for credit toward their Northeastern degree, either at Northeastern or at an outside institution.

Students on a leave of absence are considered active students and are able to register for classes in an upcoming term in a leave status. If a student is unable to register because they are inactive, the student should contact their college for reentry at the time of registration for the return term. Students are expected to register for classes upon returning from a leave of absence.

#### **LEAVE OF ABSENCE FOR INTERNATIONAL STUDENTS**

International students must discuss maintenance of U.S. immigration status with an advisor at OGS before requesting any type of leave of absence.

#### **PERSONAL OR ACADEMIC LEAVE OF ABSENCE**

Personal leaves of absence are general leaves of absence that do not meet the criteria of more specific leaves outlined in the catalog. Academic leaves are applied to a student record in the rare cases when a student has fulfilled the last remaining requirements abroad but final grades have been yet to be received at Northeastern; or are taking a leave of absence from Northeastern to pursue other academic work. A student interested in requesting a personal or academic leave of absence should speak with an academic advisor.

#### **MEDICAL OR EMERGENCY LEAVE OF ABSENCE**

Medical leave is an option available to those Northeastern students who develop a major medical condition that precludes class attendance, completion of requirements, and/or participation in co-op. Medical leave of absence requests must be initiated at UHCS (<https://www.northeastern.edu/uahcs/forms/medical-leave-of-absence/>).

Students on a medical leave will no longer have Husky Card access to the Marino Center, libraries, dining services, residence halls, and UHCS. If a student is in treatment at UHCS, they will be provided with referral resources for care in the community where they will reside during their medical leave. Students are not to be participating in student groups while on medical leave.

Emergency leaves may be granted when a student cannot continue attending class after the start of the term due to life-changing situations beyond the student's control. Students interested in requesting emergency leave are encouraged to contact We Care (<https://we-care.studentlife.northeastern.edu/>). Students can request an Emergency Leave of Absence via the Student Hub (<https://me.northeastern.edu>).

Students who have been granted a medical or emergency leave of absence due to extenuating circumstances may submit a Leave of Absence Refund Appeal Form (<https://service.northeastern.edu/sfs/>?

[id=sc\\_cat\\_item&sys\\_id=50dc23cddb464150ebcdcaf13961951&sysparm\\_category=98921886db600d54ca10819b1396197e](https://service.northeastern.edu/sfs/?id=sc_cat_item&sys_id=50dc23cddb464150ebcdcaf13961951&sysparm_category=98921886db600d54ca10819b1396197e)) for financial consideration. If the appeal is approved, please note that housing and other fees will not be included in the appeal decision; refer to the Residence Hall and Dining License Agreement (<https://www.northeastern.edu/housing/license-agreement/>). Please only complete the Leave of Absence Refund Appeal Form if you have been approved for a medical or emergency leave of absence.

*Please note that any outstanding balance (including unpaid balances) for the academic term in which the leave is taken are still due to the university.*

Financial aid recipients must contact their financial aid counselor to understand the effects on aid received.

If the leave extends more than six months, students who have taken loans for education expenses may be required to start repayment of those loans.

Students enrolled in the Northeastern University Student Health Plan will remain enrolled in the plan for the plan year, ending August 31.

#### **LEAVE OF ABSENCE DUE TO MILITARY DEPLOYMENT OR MISSIONARY SERVICE**

When a student is called to active duty or missionary service, they must request the leave by filling out the proper request form through the Student Hub (<https://me.northeastern.edu>). Proof of official deployment or call to service paperwork will be required as an attachment when filling out the leave of absence request.

When a student is called during the term, the university will:

- Excuse tuition for that term. Any payment made will be credited to the student's account.
- Post a leave of absence for the term to hold a place for the student when they return.

If a student is called near the end of the term, the student and faculty members may determine that incomplete (I) grades are more appropriate. In this case, tuition will not be waived.

When a student returns to the university after completion, they will notify the college academic student services office if the leave was longer than one year; that office will in turn notify the Office of the University Registrar. The college academic student services office will assist the student with reentry and registration. If the leave was less than one year, the student should register for classes for the upcoming term prior to returning to campus.

International students who must take a leave of absence to engage in military service in their home country must also complete a form for leave of absence with OGS.

### **RETURNING FROM A LEAVE OF ABSENCE**

Students on a leave of absence are considered active students and are able to register for classes in an upcoming term in a leave status. If a student is unable to register because they are inactive, they should contact their college for reentry at the time of registration for the return term. Students are expected to register for classes upon returning from a leave of absence.

Students who are withdrawn and are applying for Commencement may be reentered on a leave of absence, pending the college's approval, prior to the term in which they will graduate. International students returning from a leave of absence should contact OGS regarding the Student and Exchange Visitor Information System procedures three to four months prior to anticipated return date.

Students who wish to reenter the university following a medical leave must contact UHCS. Reentry from a medical leave requires receipt of all documentation delivered to UHCS approximately one month prior to the start of the term they wish to return. Once all documentation is received by UHCS, it will be reviewed and the student will be notified of the decision. Requests for reentry from medical leave must be completed no later than one week prior to the beginning of a term. Students must be enrolled in Northeastern classes for the term in which they wish to return from their medical leave of absence. More specific information about the reentry process can be found at the UHCS website (<https://www.northeastern.edu/uhs/forms/medical-leave-of-absence/>).

### **University Withdrawal**

Students seeking to withdraw from the university for any reason should meet with their academic advisor before completing the university withdrawal form online. Students should review the financial implications of withdrawing from all classes on the Student Financial Services website.

Students may be withdrawn from the university for financial, disciplinary, or academic reasons. Students looking to withdraw for medical reasons should reach out to UHCS ([mloa@northeastern.edu](mailto:mloa@northeastern.edu)) to review medical leave of absence.

## **Personal Information**

### **Change of Name**

Report all name changes to the Office of the University Registrar immediately. Official documentation of the name change is required. International students must also report all name changes to the Office of Global Services.

### **Change of Address**

Report all address changes via the Student Hub (<https://me.northeastern.edu>). Both the permanent home address and the local address are required. International students must report any changes of local address or phone number via the Student Hub (<https://me.northeastern.edu>) within 10 days in order to ensure compliance with immigration regulations.

## **Requesting and Clearing An Incomplete Grade**

An incomplete grade may be reported by the instructor when a student has failed to complete a major component of a required course, such as homework, a quiz or final examination, a term paper, or a laboratory project. Students may make up an incomplete grade by satisfying the requirements of the instructor or, if the instructor is absent, the chair of the department. Be aware that instructors' policies on the granting of incomplete grades may vary and that the final decision on an incomplete grade is up to the instructor. Instructors may deny requests for an incomplete grade.

To request an incomplete grade, the student must obtain and complete in consultation with the instructor an Incomplete-Grade Contract (<https://registrar.northeastern.edu/article/incomplete-grade-contract/>) on which the precise agreement for clearing an incomplete grade is specified. The contract is then signed by the student, the instructor, and the student's academic advisor. Copies of the form are kept by the student, the instructor, and uploaded to the student's advising notes. The maximum time period for clearing an incomplete grade is restricted to 30 days from the end of the term in which the course was offered. Instructors may require a shorter due date before approving incomplete grade requests.

International students should consult with the Office of Global Services before requesting an incomplete grade to ensure that they will remain in compliance.

If the missing assignment(s) have not been submitted to the instructor within 30 days from the end of the term in which the course was offered, or the agreed upon due date, the grade entered will reflect the student's grade in the course for the work completed and the missing assignments receiving no credit toward the final grade. Changes in the final grade will be applied to the term in which the student was enrolled in the course. Any exception to this policy or extension of the deadline must be recommended by the college in which the course was offered and must be forwarded in writing to the Office of the University Registrar for implementation.

## Retaking Courses

When the appropriate course is available, students may retake a nonrepeatable course to earn a better grade. In all cases, the most recent grade earned in a course is the one used in calculating the overall grade-point average followed by the retake notation I, indicating the course grade is included in the overall GPA; however, previous grades remain on the transcript followed by the retake notation of E, signifying that that course grade has been excluded. Consult your academic advisor before retaking a course. Students are required to pay normal tuition for all retaken coursework.

When the course description for the student's registration term indicates that the course may be repeated up to a certain number of course completions, each completion of the course (up to the limit stated in the course description) will appear on the student's transcript, and the grade for each such completion will be used in the calculation of the student's overall GPA.

## Student Bill of Academic Rights and Responsibilities

*This bill was drafted by the Student Senate, the Senior Vice Chancellor for Student Life, and members of the Faculty Senate. It was passed in the spring of 1992. It was then updated by the Student Body President and Vice President for Academic Affairs, and passed by the Student Senate in the Fall of 2017 and Faculty Senate in the Spring of 2018 for adoption in the Student Handbook (<https://catalog.northeastern.edu/handbook/>) for the 2018–2019 academic year.*

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We, the students of Northeastern University, believe that a quality education is the paramount goal of all students. In order to fulfill this goal, the university recognizes certain rights and responsibilities, which follow below.<sup>1</sup> Northeastern University students recognize and accept that redress of complaints arising from these rights is limited to the procedures specified in *Academic Appeals Policies and Procedures*.<sup>2</sup>

### Course-Related Rights

#### ARTICLE 1

Students have the right to instructors who attend classes on time.

#### ARTICLE 2

Students have the right to receive grades and feedback in a timely manner, particularly in the case of sequentially related assignments. At least one summative assessment should be given and returned a week prior to the end of the withdrawal period. Students also have the right to view work they submit to satisfy course requirements after it is graded and receive their instructor's rationale for grades received on said work.

#### ARTICLE 3

Students have the right to adequate access to instructors. This includes instructors replying to communications from students in a timely manner, suggested to be within two business days, with the exception of during university recesses, as well as maintaining consistent office hours for in-person courses, occurring at the same time at least once a week. Instructors may change office hours by notifying students in a timely manner, suggested to be within two business days, barring extenuating circumstances.

#### ARTICLE 4

Students have the right to receive a course outline, which includes a fair and explicit grading policy, at the beginning of each course. Changes to the course outline that result in a deadline, assignment, major exam, or similar course event being introduced to or moved earlier in the schedule shall be communicated to students in a timely manner, suggested to be at least 10 business days prior to the new deadline.

#### ARTICLE 5

Students have the right to instructors who communicate the material pertaining to the course effectively in the English language except in the case of foreign language instruction.

#### ARTICLE 6

Students have the right to participate in and have access to Student Government Association teacher/course evaluations.

#### ARTICLE 7

Students have the right to have a list of all course materials that must be purchased. Possible substitutions for said course materials, (i.e., acceptable previous editions of textbooks, digital versions, library owned resources, etc.) should be made available to students at least a week prior to the start of the academic term.

**ARTICLE 8**

Students have the right to alternative grading arrangements if they are unable to attend a graded activity that takes place outside the scheduled class time.

**Rights to University Academic Services****ARTICLE 9**

Students have the right to adequate access to effective academic services, including academic and co-op advising, as described in the student handbook and other university publications, provided by the university.

**ARTICLE 10**

Students have the right<sup>3</sup> to an environment conducive to learning and to faculty who respect students' academic freedom<sup>4</sup> in the classroom. When exercising academic freedom, students are expected to comply with all applicable university ethics, anti-harassment, and nondiscrimination policies.

**ARTICLE 11**

Students have the right to access university health resources provided by University Health and Counseling Services (<https://uhcs.northeastern.edu/>) (UHCS), and in accordance to Massachusetts State Law, to have access to a medical plan that they can purchase (Northeastern University Student Health Plan (<https://studenthealthplan.northeastern.edu/>))).

**ARTICLE 12**

Students have the right to access university resources provided by the university's Disability Access Services in accordance with the Policy on Equal Opportunity (<https://policies.northeastern.edu/policy107/>). Students have the right to pursue informal and formal grievances through the procedures outlined by Disability Access Services (<https://drc.sites.northeastern.edu/>)).

**Scheduling Rights****ARTICLE 13**

Students have the right to final exam schedules in accordance with established university policy, including non-conflicting final exam schedules.

**ARTICLE 14**

Students have the right to attend any course session held prior to the end of the add/drop period so long as permission from the instructor is obtained in advance and all duly registered students have proper access to seating and other course resources.

**ARTICLE 15**

Students will not be penalized for excused absences, with the understanding that students may need to make up for the academic commitment from which they were excused. Reasons for an excused absence include religious, medical issues, jury duty, bereavement, and military service. See this catalog (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/attendance-requirements/>) and other applicable policies ([http://gonu.com/sports/2013/7/15/SASS\\_0715134535.aspx?path=sass](http://gonu.com/sports/2013/7/15/SASS_0715134535.aspx?path=sass)) for the full attendance and excusal policy.

**General Academic Rights****ARTICLE 16**

Students have the right to be informed, in a timely fashion, of proposed action to be taken against them.

**ARTICLE 17**

Students have the right to the redress of academic grievances through the processes provided by the university.

**ARTICLE 18**

Students have the right to university support and resources, such as the Office of Global Services (<https://international.northeastern.edu/ogs/>), with regard to their visa status.

**ARTICLE 19**

In accordance with the university's Policy on Equal Opportunity (<https://policies.northeastern.edu/policy107/>), students have the right to a learning environment free of discrimination or harassment, including as provided for in the university's Policy on Sexual and Gender-Based Harassment and Title IX (<https://policies.northeastern.edu/policy104/>).

**ARTICLE 20**

Northeastern University's policies on student produced intellectual property can be found in the Policy on Copyright (<https://policies.northeastern.edu/policy206-USA/>) and Policy on Patents (<https://policies.northeastern.edu/policy207-USA/>).

**ARTICLE 21**

Students have the right of access to their academic and financial aid records and maintenance of the privacy of these records, as provided by applicable privacy laws.

**Student Responsibilities****ARTICLE 1**

Contribute to a climate of open inquiry and honesty in all aspects of the university's academic life. This includes reviewing, and becoming familiar with, the university's Academic Integrity Policy (p. 155).

**ARTICLE 2**

Commit sufficient time and effort for study and for use of library, studio, laboratory, and computational facilities, as appropriate for each course.

**ARTICLE 3**

Contribute to the classroom/laboratory/studio learning environment through discussion and active participation.

**ARTICLE 4**

Acquire the necessary prerequisites for full participation in each academic course.

**ARTICLE 5**

Attend scheduled classes regularly and on time, and arrive to class prepared, having completed all the readings and other assignments.

**ARTICLE 6**

Seek out faculty and teaching assistants outside of class time, to obtain help with problems encountered in a given course.

**ARTICLE 7**

Respect the academic freedom<sup>4</sup> of each faculty member and student.

**ARTICLE 8**

Assist the university in its various self-evaluations (e.g., TRACE, surveys) by responding honestly and conscientiously.

**ARTICLE 9**

Maintain effective communication with the university by providing permanent and local address information to the university through a system designated by the university, and by reading university email on a frequent and consistent basis.

**ARTICLE 10**

Act as positive representatives and genuine ambassadors of the university when studying and working in domestic and international settings associated with Northeastern University.

**ARTICLE 11**

Complete an entry (including itinerary, accommodation information, and contact information) using 'My Travel Plans,' located via the Student Hub (<https://me.northeastern.edu>) or other system as required by the university, prior to all university-sponsored travel, including but not limited to: Study Abroad, Dialogues of Civilization, exchange programs such as BSIB, Alternative Spring Break, Engineers without Borders, co-op placements, etc.

**ARTICLE 12**

Complete all required activities prior to attending classes for their entrance date (including alcohol education, violence prevention programming, required reading, etc.).

**ARTICLE 13**

Have in their possession at all times the officially approved and properly validated photo identification card.

Students who fail to comply with these responsibilities could lose certain student privileges as well as face possible disciplinary sanctions under the Code of Student Conduct (p. 160).

<sup>1</sup> The student rights, through their representatives in the Student Government Association (SGA), described in these sections arise from faculty and staff employment responsibilities and obligations to the university. Northeastern University students recognize and accept that it is the sole prerogative of the university to enforce these obligations and responsibilities and to determine whether and to what extent they are being carried out or violated in specific instances. Northeastern University students recognize and accept that their ability to effect redress of complaints arising from these rights is limited to the procedures specified in the current Student Handbook.

<sup>2</sup> The articles shall be interpreted by the Office of the Provost in conjunction with the Office of the Vice Chancellor for Student Life, and shall be monitored by the Student Government Association. Further, should any student discover that they have been subject to any violation of the principles stated herein, the student should follow the appropriate complaint resolution procedure in the Student Handbook. The Student Government Association, if requested by the student, will monitor the progress of any student academic grievances.

<sup>3</sup> Because the university operates on a twelve-month calendar in an urban environment, many construction, remodeling, renovation, and repair projects must take place while the university is in session, and other potential distractions from the learning process arise from the surrounding urban environment on which it is dependent but over which it exerts little or no control. Thus, though the university is committed to maintaining an appropriate learning environment for its students, Northeastern University students recognize and accept, as part of their relationship with the university, that the conditions described above may cause occasional disturbances to that environment.

<sup>4</sup> For more on academic freedom, please refer to the AAUP's definition (<https://www.aaup.org/report/1940-statement-principles-academic-freedom-and-tenure/>).

## Student Records Privacy

### Student Privacy—General Information

Students have specific privacy rights under applicable laws that vary depending on the global jurisdictions in which they reside. A general statement of student privacy rights is set forth in the applicable Northeastern University privacy information located at [www.northeastern.edu/privacy-information/](http://www.northeastern.edu/privacy-information/).

As a general matter, students have the right to:

- Access to their education records
- Seek to have their records amended (see the Office of the University Registrar Knowledge Base ([https://service.northeastern.edu/registrar/?sys\\_kb\\_id=1084f85387113550ba9a0fad0ebb35e1&id=kb\\_article\\_view&sysparm\\_rank=1&sysparm\\_tsqueryId=3227c5b097c34e1007f136f6f053af11](https://service.northeastern.edu/registrar/?sys_kb_id=1084f85387113550ba9a0fad0ebb35e1&id=kb_article_view&sysparm_rank=1&sysparm_tsqueryId=3227c5b097c34e1007f136f6f053af11)) for this procedure)
- Exercise some control over the disclosure of information from their records, including to parents and guardians

Additional information regarding these rights is provided below. Please note that these rights are subject to some exceptions under applicable laws. For a full statement of student privacy rights, please refer to the privacy policy referenced above.

### Family Disclosure

Students have a right to privacy in their education records, which extends to preventing access by family members. While this right is subject to some exceptions under applicable laws, unless you indicate otherwise, Northeastern will inform parents or guardians, if asked, that access to your records is restricted and they should consult with you if they would like to see your records.

### Release of Directory Information

For certain specific administrative purposes (such as confirming your attendance at Northeastern to employers and loan agencies or publicizing information about you if you are on an athletic team), Northeastern would like to release limited student data which it has designated as "directory information." You are given a choice whether or not you agree to this during the registration process. You may change your selection at any time on the university Student Hub or by notifying the university in writing by opening a case on the Registrar Service Portal (<https://service.northeastern.edu/registrar/>).

Directory information is defined in the university's Policy on Student Rights Under the Family Educational Rights and Privacy Act (FERPA) (<https://policies.northeastern.edu/policy106/>) as the following:

- Student name
- Home address (city, state, country only)
- Major field of study
- College
- Class year
- Enrollment status (e.g., undergraduate or graduate, full time or part time)
- Dates of attendance
- Degrees, honors, and awards received
- Most recent educational agency or institution attended
- Sports activity participation, showing weight/height of members of athletic teams
- Participation in officially recognized activities

### How to Exercise Privacy Rights

Subject to certain exceptions, privacy laws afford students certain rights with respect to their education records. These rights are:

1. The right to inspect and review the student's education records within 45 days of the day the university receives a request for access (or fewer days if provided by applicable law). Students should submit to the registrar, dean, or head of the academic department (or appropriate official) written requests that identify the record(s) they wish to inspect. The university official will make arrangements for access and notify the student of the time and place where the records may be inspected. If the records are not maintained by the university official to whom the request was submitted, that official shall advise the student of the correct official to whom the request should be addressed.
2. The right to request the amendment of the student's education record that the student believes is inaccurate or misleading. Students may ask the university to amend a record that they believe is inaccurate or misleading. They should write the university official responsible for the record, clearly identify the part of the record they want changed, and specify why it is inaccurate or misleading. If the university decides not to amend the record as requested by the student, the university will notify the student of the decision and advise the student of their right to a hearing regarding the request for amendment. Additional information regarding the hearing procedures will be provided to the student when notified of the right to a hearing.
3. The right to provide written consent before the university discloses personally identifiable information from the student's education records. There are a number of exceptions to this right, such as disclosure to school officials (including service providers working on the university's behalf) with legitimate educational interests or disclosures to entities involved in financial aid responsibility.

4. The right to file a complaint with the applicable regulatory agency for alleged failures by the university to comply with privacy law. In the United States, that is the U.S. Department of Education; in Canada, the Privacy Commissioner of British Columbia or Toronto (as applicable) or of Canada; and in the United Kingdom, it is the Information Commissioner's Office. At Northeastern, you may write to the Office of the University Registrar, 271 Huntington Avenue, Boston, MA 02115, or contact [privacy@northeastern.edu](mailto:privacy@northeastern.edu).

## Additional Information

Additional information can be obtained from the university's chief privacy officer at [privacy@northeastern.edu](mailto:privacy@northeastern.edu).

### Student Responsibility Statement

By accepting responsibility for their education, students enhance the development of their academic, social, and career goals. As a condition of enrollment, students are responsible for reviewing, understanding, and abiding by the university's policies, regulations, procedures, requirements, and deadlines as described in all official publications, including the university's Academic Catalog, Northeastern and college websites, and official university email communications, as applicable.

Students are responsible for meeting the degree requirements of their academic programs in all respects, including completeness and correctness of course selection, compliance with prerequisite and corequisite requirements, completion of program and degree requirements through regular, comprehensive review and understanding of the degree audit, and observance of all academic regulations and deadlines.

Students are expected to seek guidance from appropriate university representatives, such as departmental program advisors, academic advisors, co-op coordinators, and the Office of the University Registrar (<https://registrar.northeastern.edu/>), to confirm their compliance with all applicable academic expectations and requirements.

### Student Right-to-Know Act

For disclosures required by the U.S. Student Right-To-Know and Campus Security Act, visit University Decision Support (<https://uds.northeastern.edu/about/consumer-information/>).

### Substituting Courses

In some cases, it may not be possible to retake a course if a student wishes to do so. In unusual circumstances, students may petition to substitute one course for another they have already taken, as long as the subject matter of both courses is substantially alike. With the approval of the student's academic advisor and the agreement of the department that offered the first course taken, a grade received in the new course will be labeled "Substitute" on the transcript and will be treated in the grade-point-average calculation as a "retake" grade, as described above. The original grade will remain on the student's Northeastern University transcript. Students should consult with their academic advisor before enrolling in any proposed substitute course. Students are required to pay normal tuition charges for all substitute coursework.

### University-Sponsored Travel

Northeastern University is committed to the health, safety, and security of its students and all other members of the university community. As a global institution, our university members undertake university travel around the world in pursuit of teaching, research, consulting, service, cocurricular activities, and work intended to advance learning and the interests of the university. The university supports standards and expectations associated with travel that are designed to reduce personal and university risk.

To enhance the health and safety of our students, you are required to comply with the university travel policies and guidance when undertaking university travel. These include, but are not limited to:

- **Registering University Travel**—Students, faculty, and staff are required to enter their travel itineraries and other requested information into the travel registry. To access the registry, go to the Student Hub (<https://me.northeastern.edu/>) and navigate to My Travel Plans to register your travel.
- **Review Destination Risks and Take Steps to Reduce Risks Before and During Travel**—Review the country briefing for your destination found in the My Travel Plans section of the Student Hub (<https://me.northeastern.edu/>) and travel health and safety advice issued by the U.S. Department of State, the U.S. Centers for Disease Control and Prevention, other government organizations, the host nation, international organizations, etc. Travelers will be reminded about these sources via an email following trip registration.
- **Connectivity**—All students traveling on university programs must carry a cellphone with international calling, SMS, and cellular data capabilities. Phones must be able to receive incoming and make outgoing phone calls without relying solely on data-calling or a Wi-Fi signal. Phone number must be updated in the Student Hub (<https://me.northeastern.edu/>) profile and My Travel Plans registry before travel.
- **Complete Travel Petitions or Waivers**—Visit the Travel Protocols page (<https://globalsafety.northeastern.edu/travel-protocols/>) to determine what forms travelers are required to complete before participating in off-campus programming. The page also explains how to obtain approval to travel to a destination designated as high risk by the university.
- **Reduce Your Travel Cyber-Risk and Exposure**—Review and comply with the Policy on Portable Devices for High Cybersecurity Risk Destinations (<https://policies.northeastern.edu/policy701/>).

- **Personal Health Insurance**—All travelers are required to have personal health insurance that provides coverage while participating on university trips. Insurance requirements and an explanation of the university-provided urgent and emergency program can be viewed on the insurance and global safety support network pages of the university's global safety (<https://globalsafety.northeastern.edu/>) website.
- **Attend Predeparture Orientation**—PDO provides travelers with information about resources, requirements, safety, and security while traveling. Contact your program office to enroll in an in-person or online training.
- **Register Side Trips**—Side trips are travel that takes place prior to, during the course of, and/or immediately following a scheduled program but is not part of the program. Travelers are required to notify the university and register side trips.

Students are responsible for familiarizing themselves with the university travel policies and are encouraged to visit the university's global safety (<https://globalsafety.northeastern.edu/>) website for guidance. If you have questions related to travel or travel support, please email [mytravelplans@northeastern.edu](mailto:mytravelplans@northeastern.edu). If you need assistance during university travel, please call the university's 24-hour travel assistance line at +1.857.214.5332.

## Academic Appeals Policies and Procedures

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated.

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>). In such cases, the appeal described in Step 2 below is submitted to the appropriate dean(s) and a copy provided to the OUEC. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures described herein.

Note that these policies and procedures apply to graduate students only.

Individual college appeal procedures can be viewed within the college's section of this catalog.

## Academic Appeals

It is the policy of the university that all students shall be treated fairly with respect to evaluations made of their academic performance, standing, and progress. The university presumes that academic judgments by its faculty are fair, consistent, and objective. Students must understand that the substitution of a different academic judgment for that of the original evaluator is a serious intrusion upon academic prerogatives entrusted to the faculty and others involved in academic evaluations. Nonetheless, the university believes it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic or cooperative education determination. This includes claims of misinterpretation or inequitable application of any academic provision of the *Graduate Catalog* or *Faculty Handbook*.

Decisions concerning admission or readmission into a program, including dismissals, and matters related to co-op employment (other than grades received) cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

Before invoking the appeals procedures, students are always encouraged to speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the process is described in the appeals section that follows.

A student may appeal an academic determination by submitting a written statement that details the action or judgment and the basis for the appeal. All parties shall cooperate and act expeditiously in processing the appeal to completion. Appeals shall be filed in a timely manner such that they can be considered during the academic year of the student's home unit.

All appeals should be initiated and resolved in a timely manner in accordance with the detailed time limits provided in this document.

Although students are entitled to seek the advice of outside legal counsel, students may not be represented by a lawyer in the informal or formal academic appeal procedures. A student may consult with the provost or their designee at any point in this procedure for advice or assistance.

It is strongly recommended that international students consult as soon as possible with the Office of Global Services to determine the possibility of any repercussion that the timing of an appeal may have on their immigration status.

## Scientific or Research Misconduct

Scientific or research misconduct is defined as fabrication, falsification, plagiarism, or other practices that seriously deviate from those that are commonly accepted within the academic and scientific community for proposing, conducting, or reporting research and does not include honest error or honest differences in interpretation or judgments of data. (Further information can be obtained from the U.S. Office of Research Integrity, Department of Health and Human Services (<https://ori.hhs.gov/>).) Possible incidences of misconduct are to be reported immediately to the provost or their designee, who will initiate the appropriate procedures. Findings of scientific or research misconduct cannot be appealed through the process below.

## **Appeal of Final Grades and Outcomes of Other Academic Evaluative Processes**

### **STEP 1. DISCUSS CONCERNS WITH INSTRUCTOR AND/OR ADMINISTRATOR**

In many cases, students may choose to discuss their concerns with the faculty member who taught the course or a member of the qualifying exam committee. If after this conversation the student's concerns remain unresolved, or if the student is not comfortable discussing the issue with the instructor or other faculty member(s) involved, the student should request a meeting with the appropriate administrator (e.g., director, assistant or associate dean, chair, or group leader) to further discuss their concerns. If these initial attempts to address the issue fail to resolve the student's concerns, or the situation precludes a student from pursuing these steps, the student can initiate a formal appeal as follows. Note that this step should occur as soon as possible after the academic determination given the time frame for appeal statement submission described in Step 2.

### **STEP 2. PREPARE AN APPEAL STATEMENT**

A student must initiate a formal appeal of an academic determination by submitting a written statement (the Statement) that specifies the details of the action or judgment that they seek to appeal. The Statement must start with a clear description of the basis for the appeal and should include: (1) basic facts about the situation leading to the appeal; (2) when the situation occurred; (3) who was involved; and (4) the resolution sought by the student. All relevant supporting materials should be attached as addenda to the Statement. Appeals should avoid unsubstantiated, defamatory, or *ad hominem* accusations regarding the motivations of the faculty member or other persons involved in making the academic determination.

The Statement, and supporting materials, as submitted to and reviewed by the unit (i.e., college, school, department, or group responsible for reviewing the academic determination), will serve as the basis of the appeal throughout the appeals process, including at the university level.

Graduate students shall submit the Statement and all supporting materials to the college/school administrator specified in the college/school procedures.

The Statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of degree conferral date.

### **STEP 3. COLLEGE/SCHOOL-LEVEL APPEAL**

A copy of this decision shall be sent to the college/school dean or their designee of the student's home college/school.

### **STEP 4. UNIVERSITY-LEVEL APPEAL**

If the student is not satisfied with the college/school's disposition of the matter, or if the appeal is not resolved within 35 calendar days after originally submitted to the college/school pursuant to Step 3, the student may further pursue the matter by requesting in writing within 10 calendar days of the notification from the college/school in Step 3 that the university convene the Academic Appeals Resolution Committee to review the issue. Students may obtain information on this process from the provost or their designee. This committee has been designated as the final authority on these matters.

#### **A. Academic Appeals Resolution Committee**

The Academic Appeals Resolution Committee shall be a standing committee consisting of the following:

- The provost or their designee, who shall be the chair of the committee, and nonvoting member.
- Three faculty members and one alternate faculty member (with the alternate serving in instances where there is a conflict of interest or when a member has to be replaced) all from different colleges appointed by the Faculty Senate Agenda Committee. Members will serve a one-year term with no term limits.
- If the appeal had at any point involved a matter of harassment/discrimination, the committee shall include a representative of the OUEC, who shall be a nonvoting member.

#### **B. Preliminary Matters**

Upon receiving an appeal, the committee shall obtain copies of all documentation related to the appeal from Steps 1, 2, and 3, including the procedures of the relevant unit and college/school. If the Academic Appeals Resolution Committee determines, by a majority vote, that the appeal is patently without substance or merit, it may dismiss the appeal.

#### **C. Investigation**

The Academic Appeals Resolution Committee shall investigate the matter under appeal by studying the relevant documents (the Statement, supporting documents, and additional accumulated documentation), interviewing the parties (especially the student and the involved faculty member), and taking any other action it deems appropriate. A resolution shall be rendered within 35 calendar days of appeal submission. At no time shall the committee be bound by rules of evidence but shall at all times conduct itself in a manner that is not arbitrary or capricious. The Academic Appeals Resolution Committee may, but is not required to, hold a hearing prior to resolving the issues. However, in all instances, the student and the involved faculty member shall have the right to appear separately and privately before the Academic Appeals Resolution Committee. The student shall have the right to have an advocate from the university community present during their testimony to the Academic Appeals Resolution Committee.

#### **D. Authority to Act**

The Academic Appeals Resolution Committee has been designated as the final authority on academic matters. At the conclusion of its investigation, the Academic Appeals Resolution Committee shall resolve, by majority vote, the issue by either upholding the finding of the college/school, in which

case no further appeal is available, or granting such relief to the student as the Academic Appeals Resolution Committee deems appropriate. The Academic Appeals Resolution Committee shall not render a resolution that contradicts the prior findings or actions of the OUEC.

#### E. Resolution

All direct parties to the appeal, including but not limited to the student, the faculty member (or others involved in academic evaluations), the dean of the involved college(s), the Faculty Senate, and the Office of the University Registrar, shall be promptly informed in writing of the decisions and actions taken during this academic appeals procedure.

#### F. Action

The dean(s) or their designee in the involved college(s) shall take whatever action is necessary to implement fully the resolution of the Academic Appeals Resolution Committee.

#### G. Appeal

Once adjudicated, the matter is considered closed, and no further appeal can be instituted by the student or the involved faculty member with respect to the issue(s) raised at any level of the formal appeals resolutions procedures.

Step 1: Discuss concerns with instructor or appropriate administrator	Time frame: As soon as possible after academic determination (see note 1 below)
Step 2: Student prepares/submits appeals statement to unit or college/school	Time frame: Within 28 calendar days of academic determination
Step 3: Unit/college/school-level appeal process	Time frame: Decision notification within 35 calendar days of student appeal statement submission
Step 4: University-level appeal process	Time frame: Student submits within 10 calendar days of college/school decision; resolution rendered within 35 calendar days of appeal submission

Note 1: Step 1 should occur as soon as possible after the academic determination given the time frame for appeal statement submission described in Step 2.

## Academic Calendars

The graduate schools' programs are offered on a semester calendar consisting of 15 weeks. The College of Professional Studies graduate programs are offered on a quarter calendar consisting of 12 weeks.

### Quarter Programs

For student records that include quarter hours, the approved semester-hour conversion rate is (quarter hours) x 0.750. For example, a 4-credit quarter course is equivalent to a 3-credit semester course.

### Semester Programs

Traditional semester hours apply.

## Audit Policy

Full-time Northeastern University students may audit one class per term as an overload. In all colleges with the exception of the College of Professional Studies, there is no additional charge.

- Students are permitted to petition ([https://service.northeastern.edu/registrar/?id=kb\\_article\\_view&sysparm\\_article=KB000019998](https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019998)) from the end of the course-add period to the end of the third week of classes.
- Permission is based on the availability of a seat in the class.
- Students must obtain advisor approval and meet the prerequisites and any other required approvals for the class.
- Instructor permission, as well as approval by the associate dean of the college offering the course, is required.
- The coursework required is at the discretion of the instructor.
- Once a student opts to audit a course, the audit status of the course cannot be changed.
- A signed Petition to Audit ([https://service.northeastern.edu/registrar/?id=kb\\_article\\_view&sysparm\\_article=KB000019998](https://service.northeastern.edu/registrar/?id=kb_article_view&sysparm_article=KB000019998)) must be presented to the Office of the University Registrar during the designated audit-add period.
  - Students will not be registered for approved audited course(s) until after the add period is over for the intended term.
- Excluded courses are co-op, labs, language courses, any off-campus course, any online course, and any course required for the major or degree.
- Audits carry no academic credit.

## Cooperative Education

Website (<https://careers.northeastern.edu/cooperative-education/>)

Cooperative education is the cornerstone of Northeastern University's experiential learning approach, in which on-campus study is enhanced by real-world experience through full-time employment at locations all over the world. Through co-op, students alternate periods of academic courses with periods of employment in positions related to their academic or career interests. This combination provides an integrated learning experience that enhances both in-class studies and career development.

### General Requirements

- Be a full-time student to participate in co-op.
- Complete all pre-co-op requirements as established by the college of the student.
- Make satisfactory progress toward degree completion, including grade-point average requirements as defined by the university, the colleges, and the major program curricula.
- Have accurate information about the co-op position in the university's official co-op system of record, including specific start and end dates and meeting the minimum hour and day requirements.
- Not participate in co-op in the final term unless it is specified in the curriculum requirements of the program in the catalog.
- Resolve any previous disciplinary or academic probation issues, or have the cooperative education coordinator approve a plan to resolve these issues prior to applying for co-op jobs.
- Have any self-developed co-op approved by the cooperative education coordinator before accepting the position.
- Comply with any preemployment checks required by the employer, such as drug testing, credit checks, physical examinations, security clearance, and criminal record checks.
- Participate in Title IX training, as required.
- Complete any additional requirements (<https://careers.northeastern.edu/students/student-co-op/global-co-op/>) if participating in a global co-op.
- Work with the cooperative education coordinator if an Unsatisfactory (U) grade has been received for a past co-op to reestablish eligibility in accordance with the policies and requirements of the college.

### TRANSFER AND INTERNATIONAL STUDENTS

- Transfer students from other universities must have met the same requirements in their major's co-op program as nontransfers and must have completed at least one semester of classes before starting co-op.
- International students must attend one academic year, or its equivalent, and obtain proper authorization from the Office of Global Services before engaging in co-op.

### Academic Requirements

1. **Be full-time while on co-op. Full-time status for co-op is defined as either:**
  - a. One full-time co-op job; 32–40 hours per week
  - b. Two simultaneous half-time co-op jobs; 16–31.99 hours each
  - c. One half-time co-op job; 16–31.99 hours with graduate students taking 3 or more academic credits or undergraduate students taking 6 or more academic credits
    - i. Undergraduate students on co-op in a summer 1 or summer 2 term may be registered for one half-time co-op without acquiring a second job or taking an accompanying class.
2. **Meet the minimum length requirements for an academic term:**
  - a. Semester full-term: minimum of 11 weeks or 55 workdays
  - b. Quarter full-term: minimum of 9 weeks or 45 workdays
  - c. Summer 1 or summer 2 term: minimum of 5 weeks or 25 workdays
3. **Receive a grade of Satisfactory or Unsatisfactory for the co-op experience.**

### Co-op Duration

Graduate Students Enrolled in Colleges Other than the College of Professional Studies:

- Students may be hired into co-op positions for periods of four to eight months in one of the following patterns:
  - Four months (spring, fall, or summer full terms)
  - Six months (spring term plus summer 1 term, or summer 2 term plus fall term)
  - Eight months (spring term plus summer full term, or summer full term plus fall term)
- In addition, students enrolled at a Canadian campus may be hired into co-op positions for periods of four to eight months, including continuous periods spanning the fall and spring semesters. In the case of such eight-month fall/spring term co-op assignments, students are required to enroll full-time in classes during the summer term immediately following the assignment. If a student only needs to take one additional

course to complete their program's requirements, they are only required to enroll in that one class in the summer term immediately following the assignment.

#### Graduate Students Enrolled in the College of Professional Studies:

- Students may be hired into co-op positions for periods of three months or six months.

### Co-op Financial Planning

- No tuition is charged while a student is on co-op only (students will pay room and board if they stay in university housing).
- If a student takes a credit-bearing class while on co-op, tuition will be charged at the per-credit rate.
- Students who wish to register for more than 4 credits while on full-time co-op must complete the Petition Registration form ([https://service.northeastern.edu/registrar/?sys\\_kb\\_id=0d1a05e3c3618a1030a83051150131f0&id=kb\\_article\\_view&sysparm\\_rank=4&sysparm\\_tsqueryId=49e2b3d397df82945a68bd8c1253af8a](https://service.northeastern.edu/registrar/?sys_kb_id=0d1a05e3c3618a1030a83051150131f0&id=kb_article_view&sysparm_rank=4&sysparm_tsqueryId=49e2b3d397df82945a68bd8c1253af8a)).
- Financial aid will be distributed to match the student's tuition bill and other allowable expenses.
- Students on co-op are required to maintain the same health insurance coverage (either through a private provider or through the university program) as they would while attending classes.

### Registration for Co-op

Students are registered for co-op based on a completed co-op record that meets the minimum hour and day requirements with accurate start and end dates in the university's official co-op database system. Students must be registered for the co-op work experience course by the end of the add period or alternately registered for classes if still searching for a job by this deadline. All co-op positions need to be approved by the university and entered as completed records in the official co-op database system by the last day to drop without a W for the respective semester.

### Further Information

For more detailed information about co-op policies and procedures, see the *Cooperative Education Student Handbook* on the Cooperative Education website (<https://careers.northeastern.edu/cooperative-education/>).

### Departmental Jurisdiction

Certain departments of the university shall have the power to set down rules and regulations governing the operation of the departments' respective areas of responsibility. Such rules and regulations shall be in accord with the Student Bill of Academic Rights and Responsibilities (p. 180), as well as with the policies described in this document.

### Dropping a Class

Not attending class does not constitute withdrawal. Students receiving a grade of W or NE in any course are responsible for the costs associated with that course. Students must drop courses using processes described below.

*Note: College of Professional Studies graduate students should consult the CPS graduate section of this catalog (p. 836) for class drop timelines specific to CPS graduate terms.*

#### In Fall and Spring Semesters

- Through the third week of the semester, students may withdraw without any grade being posted to the transcript. Courses may be dropped via the Student Hub (<https://me.northeastern.edu/>).
- Between the fourth week and the last day of classes, course withdrawals are indicated by a W on the student's record. Courses may be dropped via the Student Hub. No financial adjustment is made for courses receiving a W grade.
- After the last day of classes, no withdrawals are accepted for any reason. A letter grade for the course will be posted on the transcript.
- Dropping below full-time enrollment may affect financial aid, health insurance eligibility, and the maintenance of proper nonimmigrant visa status.

#### In Summer Half Semesters

- Through the second week of the half semester, students may withdraw without any grade being posted to the transcript. Courses may be dropped via the Student Hub.
- Between the third week and the last day of classes, course withdrawals are indicated by a W on the student's record. Courses may be dropped via the Student Hub. No financial adjustment is made for courses receiving a W grade.
- After the last day of classes, no withdrawals are accepted for any reason. A letter grade for the course will be posted on the transcript.
- Dropping below full-time enrollment may affect financial aid.

## Final Examinations and Related Policies on Other Exams

All final examinations, term papers, or projects must be returned to the student or be retained by the department for a period of one year.

### Full-Time Status

*Notes: Full-time status may be defined differently for federal loan purposes. The criteria below apply to students enrolled in colleges other than the College of Professional Studies. Please consult the College of Professional Studies section of this catalog (p. 833) for criteria that apply to students in CPS.*

A graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester with the following considerations:

- Students who hold stipended graduate assistantships will be considered full-time if enrolled for a minimum of 6 semester hours of credit.
- Students for whom English is a second language, at the discretion of their departments, will be considered full-time if they are enrolled in a minimum of 8 semester hours or three courses, whichever is less.
- Students holding Dean's scholarships, Diversity fellowships, Double Husky awards, or being supported by Graduate Student Scholarships will be considered full-time if they are enrolled in a minimum of 8 semester hours.
- Students enrolled in Dissertation or Dissertation Continuation are considered full-time.
- International students enrolled in graduate programs at Northeastern University must consult with the Office of Global Services (<https://international.northeastern.edu/ogs/>) on all matters regarding the maintenance of full-time status.

### Graduation Requirements

To be eligible to receive degrees, students must meet all academic requirements. They must also clear all financial and disciplinary deficiencies.

In addition, each program of study has specific academic requirements. These are specified for each program under the various schools and colleges in this catalog.

Students are expected to monitor their progress toward degree completion or certificate completion throughout their studies via their online degree audit, accessible via the Student Hub (<https://me.northeastern.edu/>).

All eligible degree candidates must complete the graduation application by the applicable deadline. Before applying to graduate through the Student Hub, students should take the time to review their current program information, i.e., degree, major, and concentration.

### Minimum Cumulative GPA

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative GPA of 3.000 or higher. This requirement may be supplemented by additional restrictions established by the graduate program or the college's graduate office such as, but not limited to, the maximum number of individual courses with grades below 3.000 that may be obtained without being required to withdraw or a minimum GPA in each semester.

Students falling below 3.000 are placed on academic probation. If the student remains on academic probation for two semesters, they may be terminated from the graduate program.

Not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. The last grade earned in each of these repeated courses is counted in the calculation of the cumulative GPA.

More information regarding course grading and academic disputes may be found at Academic Appeals Policies and Procedures (p. 185).

### Overload Conditions for Graduate Assistants

Graduate assistants are expected to devote full-time effort to their studies and the duties of their award.

They are not permitted to hold any other job during the term of their assistantship; however, they may be offered limited extra work on campus. Graduate assistants who are not on F-1 or J-1 visas can be offered overload work that does not exceed an average of 6 hours a week or 90 hours a semester, for a total of 270 hours a year (or three semesters). As part of this work, graduate assistants may be hired to teach one 3-semester-hour course as an overload during the year (180 hours). The hours worked during the weeks between semesters are included in this total.

### Pass/Fail (Satisfactory/Unsatisfactory) Grading

The individual schools and colleges determine whether a course will be graded on a pass/fail basis.

## Regulations and Requirements for All Graduate Degree Programs

A copy of each graduate degree program as approved by the Board of Trustees and as officially amended is on file in the Office of the Provost. This record contains the goals, learning objectives, and all requirements for the program. All descriptions of the program in the university, college, and department publications must conform to this officially approved record.

Standards of admission are specific to certificate and degree programs and are found on each each college's or offering unit's website.

### Admission Requirements

Prior to beginning a graduate program at Northeastern University, students must have met one of the following criteria:

1. Received a bachelor's degree or equivalent from an accredited college or university
2. Received a master's degree or equivalent degree from an accredited college or university
3. Received a first professional or equivalent degree from an accredited college or university
4. Been accepted into an approved bachelor's-to-graduate-degree program at Northeastern

### Deferment of Enrollment Due to Military Deployment or Call to Service

When a student who has confirmed their intent to enroll in a Northeastern University degree program is to be deployed or called to active duty prior to matriculation, they may submit a request for enrollment deferment. For U.S. military cases, students must apply to the Director of Military Affiliated Enrollment and Financial Services. International students should follow the Admission Acceptance Deferral process set forth by the Admissions Office and the Office of Global Services. The respective office will notify the destination academic program of the student's intent to defer.

The enrollment deferment request shall follow established procedures that include official proof of deployment (or qualifying call to service) and estimated term of future enrollment (if known).

Under this type of deferment, the following conditions will apply:

- Any deposit for the program will be waived and any deposit payment made previously will be credited to the student's account.
- An enrollment deferment shall be posted to the students' admission record, not to exceed two years beyond the first day of the original term of enrollment.
- If the deferment due to deployment or active service continues beyond two years, the student may request further deferment; however, the university reserves the right to request that the student reapply for admission in those cases.

When the admitted student intends to enroll in the university after completion of military obligation, U.S. military-affiliated students will notify the Director of Military Affiliated Enrollment and Financial Services in writing, including the term they intend to enroll. International students should follow the procedures on the Office of Global Services website for securing the appropriate immigration documentation to join Northeastern for their intended term. The university reserves the right to delay the student's start term from their intended term due to curriculum alignment or accreditation enrollment caps.

### Transfer and Other Advanced Standing Credit

Transfer credits from other institutions (or other programs within the university) will only be accepted at the discretion of the student's destination academic unit and the associated college with the following constraints:

- For graduate certificate programs, a maximum of 3 semester hours or 4 quarter hours of credit earned at another institution may be accepted toward the credential being pursued at Northeastern, provided the credits meet the above-listed standards.
- For master's degree programs, a maximum of 30% of the credits required for the degree that are earned at another institution may be accepted toward the degree being pursued at Northeastern, provided the credits:
  1. Consist of work taken at the graduate level for graduate credit
  2. Carry grades of 3.000 or better
  3. Have been earned at an accredited institution
  4. Have not been used toward any baccalaureate or advanced degree or certificate at another institution

Advanced standing is based on criteria established by the offering school or college and implemented in coordination with the Office of the University Registrar. When applied, advanced standing reduces the total credits required to complete the primary program.

The combination of advanced standing and transfer credit shall not exceed 30% of the credits required for the degree. Credit for prior experiential or non-collegiate-sponsored learning is limited to 25% of the degree credits required for the degree.

Graduate course credits earned at Northeastern by undergraduate students enrolled in a PlusOne program will be applied toward both the undergraduate and graduate degrees as prescribed by the graduate program in which the student is enrolled, not to exceed 16 semester hours or 21 quarter hours. Transfer credit may not be applied to graduate degrees that are completed as part of a PlusOne program. Deviations from this limit shall be considered on a case-by-case basis by the University Graduate Curriculum Committee.

- Students may credit-share specified courses taken while in undergraduate status for both the bachelor's and PhD degrees. A student who departs from the program before receiving PhD candidacy may opt to use those courses toward a master's degree earned. However, such credit sharing cannot be used for more than two credentials, i.e., degrees and certificates. Please see above for limits on credit sharing between credentials.
- For doctoral programs, a maximum of 30% of the total semester hours of required coursework may be granted upon the recommendation of the admitting college's graduate committee.

Transfer credits must have been earned within five academic years of the date of matriculation in the Northeastern program to which they are to be applied.

Grades earned in courses to be applied as transfer credits are not counted as part of the overall grade-point average earned at Northeastern and are posted with a grade of T to the transcript.

### **Provisional or Special Students**

Students cannot be admitted under provisional conditions, i.e., requiring preparatory or remedial coursework that must be successfully completed for progression in the program. Special students are nondegree students taking courses, not to exceed 12 semester or 16 quarter hours, while not admitted to a specific program.

### **Uniform Credit System**

One credit hour of academic credit consists of three hours of work per week throughout the term, usually one hour of class contact and two hours of outside work. When students are registered for thesis credits, directed study, or internship, the appropriate number of credit hours will be determined using the same method. Programs may vary the ratio of class time to preparation time depending on the learning outcomes and accreditation standards appropriate in their field(s).

A quarter hour is evaluated as three-quarters of a semester hour.

When students are registered for thesis credits, directed study, or internship, the appropriate number of credit hours will be determined using the same method.

Additional information on course and credit guidelines can be found here (p. 174).

### **Undergraduate Credit for Graduate Courses**

Undergraduate students who are juniors or seniors may enroll in graduate courses for credit toward their undergraduate degrees if they meet all prerequisites as determined by the graduate director and they receive permission from the instructor of the course and from the student's undergraduate academic advisor.

### **Time Limit for Course Credit**

Course credits earned in the program of graduate study, or accepted by transfer, are valid for a maximum of seven years unless the relevant graduate office grants an extension.

### **Academic Progression**

Grades submitted to satisfy, in whole or in part, the requirements for any graduate degree or certificate of advanced study must yield a cumulative GPA of 3.000 or higher. This requirement may be supplemented by additional restrictions established by the graduate office such as, but not limited to, the maximum number of individual courses with grades below 3.000 that may be obtained without being required to withdraw or a minimum GPA in each semester.

Students falling below 3.000 will be placed on academic probation. If the student remains on academic probation for two terms, they may be terminated from the graduate program. A PhD student will be considered to be on academic probation if their cumulative GPA falls below 3.000 and/or if they are not making acceptable research progress as defined by the college through an academic review process that occurs at least annually.

No more than two nonrepeatable courses may be retaken to satisfy the curricular requirements for the degree. A specific course may not be retaken more than once. The last grade earned in each of the retaken courses will be counted in the calculation of the cumulative GPA. Courses with a specified attribute of "repeatable" can be repeated up to the specified limit, and the earned grade in each occurrence of course completion will count toward the calculation of the cumulative GPA.

Any incomplete grades must be cleared in accordance with the university's policy concerning incomplete grades (<https://catalog.northeastern.edu/graduate/academic-policies-procedures/incomplete-grade-policy/>).

### **Language Requirements**

The committee in charge of the degree program may establish a language requirement.

### **Required Training**

Graduate programs may require relevant training that all of the program's students must complete by deadlines communicated by the university or by the student's graduate program advisor.

## Regulations and Requirements for Graduate Certificate Programs

### Certificates That Appear on the Transcript

#### DEFINITION

A graduate certificate program is a program of study requiring at least three graduate courses and not fewer than 12 semester hours or 16 quarter hours of graduate credit. Successful completion of such a certificate program will be recorded on the student's transcript. Appropriate graduate credits taken as part of a graduate certificate program may be counted toward a graduate degree, at the discretion of the graduate degree program.

#### ADMISSION

All students admitted to a certificate program must satisfy the general requirements for admission as a graduate student and the requirements for the specific certificate program.

#### PROCEDURES FOR THE APPROVAL OF NEW CERTIFICATE PROGRAMS

New certificate programs are developed following the procedure outlined in the Guidelines for New Degree Programs found on the Office of the Provost website. ([https://provost.northeastern.edu/wp-content/uploads/NewGraduateCertificate-Non-CAGS-ProposalGuidelines\\_5.11.17.pdf](https://provost.northeastern.edu/wp-content/uploads/NewGraduateCertificate-Non-CAGS-ProposalGuidelines_5.11.17.pdf))

All new certificate programs require the approval of the University Graduate Curriculum Committee and notification of the Faculty Senate.

#### PROCEDURES FOR CERTIFICATE PROGRAM REVIEW

Certificate programs will be reviewed in the context of departmental reviews. Information about these reviews can be found on the Office of the Provost website. (<https://provost.northeastern.edu/wp-content/uploads/Guidelines-for-Academic-Program-Review.-December-2022.-Final.pdf>)

#### GENERAL REGULATIONS

Except as indicated herein, certificate programs shall be subject to the same regulations and procedures as master's degree programs.

#### TRANSCRIPT NOTATION

Only approved degrees, certificates, and concentrations appear on the transcript.

## Regulations and Requirements for the Master's Degree

### Admissions Requirements

All students admitted to a master's program must satisfy the general requirements for admission as a graduate student and the requirements for the specific master's program. To be eligible for admission, with the exception of PlusOne students, applicants must have a bachelor's degree from an accredited college or university.

### Course Requirements

A candidate for the master's degree must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered.

The requirements for the master's degree are a minimum of 30 semester hours beyond the bachelor's degree, except in the College of Professional Studies in which 45 quarter hours of graduate work are required. Undergraduate-level coursework will not be accepted to meet the requirements for the master's degree.

### Comprehensive Examination

The committee in charge of the degree program may require a final written or oral comprehensive examination(s) for partial fulfillment of degree requirements.

### Thesis

If a thesis is required in partial fulfillment of degree requirements, it must show independent work based, in part, on original material and must meet the approval of the student's thesis committee. The committee in charge of the degree program is responsible for providing instructions concerning preparation of the thesis.

The student must submit the thesis to ProQuest (or a university-sanctioned successor system) according to the time schedule provided by the relevant graduate office. Information on archiving a thesis is available in the relevant graduate office.

## Regulations and Requirements for PlusOne Degree Combinations

"PlusOne program" refers to any program in which students accelerate the attainment of the postbaccalaureate degree by applying graduate credits taken as an undergraduate toward both the undergraduate and graduate degrees.

### Credit Sharing

Not more than four graduate courses or 16 semester hours (or 21 quarter hours), whichever is greater, taken while a student is in undergraduate status and participating in an accelerated master's (so-called PlusOne) program at Northeastern University, may be used to satisfy the requirements for both

the undergraduate and graduate degrees. Exceptions to this credit-sharing limit (due to significantly higher credit requirements for the graduate degree or other special provisions) must be approved through governance processes.

## **Use of Master's-Level Credits Earned While in Undergraduate Status**

Unless they have been accepted into and are enrolled in a designated PlusOne program before the undergraduate degree is conferred, students who took graduate classes to fulfill requirements toward an undergraduate degree at Northeastern may not use those credits later toward a master's degree. If the student took graduate classes resulting in credits beyond those used for the undergraduate degree program (were not used in undergraduate degree audit), those credits may be considered for use toward a subsequent degree program. If course credits are used toward both the undergraduate and graduate degrees in a PlusOne, they cannot be used for other credentials (e.g., a certificate).

Graduate course credits earned while a student was in undergraduate status and enrolled in a designated PlusOne program, used to fulfill requirements toward the undergraduate degree, and eligible to be applied toward the designated PlusOne master's degree program must be designated for such use within the subsequent three academic years after the student receives the bachelor's degree in which those credits were earned.

## **Regulations and Requirements for Professional Doctorate Degree Programs**

### **Admissions Requirements**

A student enrolled in a professional doctorate degree program must satisfy the general requirements for admission as a graduate student and the requirements for the specific professional doctorate degree program. To be eligible for admission, applicants must have a bachelor's degree from an accredited college or university.

### **Academic Classification and Degree Candidacy**

- Doctoral student: Students in this classification have been admitted to a doctoral program.
- Doctoral candidate: Each program in which the term candidacy is used shall have a policy defining candidacy. Students in this classification will have completed all departmental, college, and university requirements except for the dissertation (if applicable). These requirements vary by program but minimally include completion of approximately 30 semester hours or 45 quarter hours of acceptable graduate work beyond the bachelor's degree or possession of a previously earned master's degree that is acceptable to the department and certification by the graduate office. The requirements frequently include a comprehensive examination and/or a proposal defense.

### **Academic Residency Requirement**

In the context of a doctoral degree program, the residency requirement refers to either:

- A minimum number of credits or semesters that must be completed at the degree-granting institution
- A minimum duration during which the degree candidate must be enrolled full-time at the degree-granting institution

In those programs in which the term candidacy is used, after reaching candidacy, students must register for Dissertation for a minimum of two semesters in order to fulfill their formal residency requirement. Continuation status enrollment is for students who are postcandidacy, have completed all coursework and their residency requirement, and are actively engaged in completing a dissertation.

### **Responsible Conduct of Research**

All doctoral students for whom Responsible Conduct of Research training is required must complete training according to the university's Policy on Responsible Conduct of Research (<https://policies.northeastern.edu/policy500/>).

### **Course Requirements**

A candidate for the professional doctorate degree must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered.

The requirements for the professional doctorate degree shall be determined by the program.

Undergraduate-level coursework will not be accepted to meet the requirements for the professional doctorate degree.

### **Qualifying Examination(s)**

In departments that require qualifying examinations, students must be notified in writing of the nature and regulations governing these examinations and of how their performance on the examinations will affect their normal progress toward the degree. The graduate office shall be made aware of the department regulations concerning such examinations.

### **Dissertation Committee**

For programs requiring the dissertation, the dissertation committee shall have at least three members, two of whom shall be from Northeastern University. The chair of the dissertation committee will be a faculty of Northeastern and will hold an appropriate terminal degree for the discipline. Exceptions to this policy may be granted by the dean of the relevant college (or their designee) based on the qualifications and experience of the faculty member who would serve as chair.

## Comprehensive Examination

For programs requiring a comprehensive examination, the committee in charge of the degree program may require a final written or oral comprehensive examination(s) for partial fulfillment of degree requirements.

## Thesis or Dissertation in Practice

If a thesis or dissertation in practice is required in partial fulfillment of degree requirements, it must show independent work based, in part, on original material and must meet the approval of the student's thesis committee. The committee in charge of the degree program is responsible for providing instructions concerning preparation of the thesis.

The student must submit the thesis to ProQuest (or a university-sanctioned successor system) according to the time schedule provided by the relevant graduate office. Information on archiving a thesis is available in the graduate office.

## Time Limitation for Achieving Candidacy and Degree Completion

For programs in which the term candidacy is used, degree candidacy must be achieved within three years of entering the doctoral program. For all programs, the degree must be completed within seven years after entering the program. A student may request an extension of these time frames from the graduate office.

## Pursuit of an Academic Credential Outside Student's Major

A student enrolled in a doctoral program may seek to pursue academic credentials (e.g., master's degree or certificate) outside of their major only if, prior to completing more than one-third of the required credits for that credential, they obtain the approval of their primary advisor, obtain the approval of the graduate office, and apply to and are accepted into the major offering that credential.

### Regulations and Requirements for the Certificate of Advanced Graduate Study

The Certificate of Advanced Graduate Study provides specialized study above the master's degree. It is a course of study that falls between the master's and doctoral degree and culminates in a graduate certificate.

#### Admissions Requirements

An applicant for the CAGS must hold a master's degree in a related field from an accredited institution and must complete the admission procedure described in the material of the graduate schools. All students admitted to a CAGS program must satisfy the general requirements for admission as a graduate student and the requirements for the specific CAGS program.

#### Course Requirements

A candidate for the CAGS must satisfactorily complete an approved program conforming to the requirements of the graduate school and department or program in which the candidate is registered. The candidate must complete a minimum of 24 semester hours or, in the case of the College of Professional Studies, 32 quarter hours of credit beyond the master's degree.

### Regulations and Requirements for Doctor of Philosophy (PhD) Programs

The formal requirements for the PhD degree are the following: completion of the coursework mandated by the individual degree program, fulfillment of the residency requirement, formal training in the Responsible Conduct of Research for students as appropriate, qualifying and/or comprehensive examination(s) or equivalent as required by the degree program, continuous registration, a final oral examination conducted by the student's PhD committee, and submission of a dissertation to the relevant graduate office and to ProQuest (or a university-sanctioned successor system) for archiving. The dissertation must be based on original and independent research.

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#### Admissions Requirements

All students admitted to a doctor of philosophy program must satisfy the general requirements for admission as a graduate student and the requirements for the specific PhD program.

#### Academic Classification and Degree Candidacy

1. Doctoral student: Students in this classification have been admitted to a doctoral program.
2. Doctoral candidate: Every degree program shall have a policy defining candidacy. Students in this classification will have completed all departmental, college, and university requirements except for the dissertation. These requirements vary by program but minimally include completion of approximately 30 semester hours of acceptable graduate work beyond the bachelor's degree or possession of a previously earned master's degree that is acceptable to the admissions committee and certification by the graduate office. The requirements frequently include a comprehensive examination and/or a proposal defense.

#### Academic Residency Requirement

In the context of a doctoral degree program, the residency requirement refers to either:

1. A minimum number of credits or semesters that must be completed through the degree-granting institution
2. A minimum duration during which the degree candidate must be enrolled full-time at the degree-granting institution

After reaching candidacy, students must register for Dissertation for a minimum of two consecutive semesters in order to fulfill their formal residency requirement. Continuation status enrollment is for students who are postcandidacy, have completed all coursework and their residency requirement, and are actively engaged in completing a dissertation.

## **Responsible Conduct of Research**

All doctoral students for whom Responsible Conduct of Research training is required must complete training according to the university's Policy on Responsible Conduct of Research (<https://policies.northeastern.edu/policy500/>). ([https://www.northeastern.edu/policies/Policy\\_on\\_Responsible\\_Conduct\\_of\\_Research.pdf](https://www.northeastern.edu/policies/Policy_on_Responsible_Conduct_of_Research.pdf))

## **Course Requirements**

The program committee in charge of the degree program specifies the doctoral course requirements.

## **Requirements for Candidacy**

In programs that require qualifying examinations, students must be notified in writing of the nature and regulations governing these examinations and of how their performance on the examinations will affect their normal progress toward the degree. The graduate office shall be made aware of the program regulations concerning such examinations.

## **Annual Review of Student Progress**

Units shall define milestones for achieving satisfactory academic progress and shall establish a published process by which the academic progress of every PhD student will be evaluated through an annual review. A copy of each review shall be submitted to the student and the graduate office. If the annual academic review reports that a student is not making sufficient academic progress due to research performance, the PhD student will be placed on academic probation. After two consecutive semesters on academic probation, the student may be dismissed.

## **PhD Dissertation Committee**

The dissertation committee shall have at least three faculty members, two of whom shall be from Northeastern University. The chair of the dissertation committee (who is presumed to be the thesis advisor) will be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD (or other research doctorate) or an appropriate terminal degree for the discipline. Colleges, the provost, or provost-designee may permit full-time faculty from other ranks: 1) on a case-by-case basis to serve in this role based on the research qualifications and experience of individual faculty members or 2) based on equivalent faculty definitions at locations operating under different faculty rank systems.

The PhD committee should be appointed early enough to advise in the formulation of the student's program and in refining the research topic for the dissertation. Within the constraints of the above criteria, the PhD program faculty will determine the process by which dissertation committees are established. The final list of dissertation committee members shall be reported to the college's associate dean for graduate education or administrative unit managing the degree program.

If a student's major advisor leaves Northeastern (including transition to emeritus status), that person may continue the research direction of the dissertation or thesis. However, a co-advisor must be appointed from the academic department or program. The student will then have two advisors, one an official member of the Northeastern faculty who will be available for research and administrative matters and the ex-Northeastern advisor. If a new major advisor is appointed, the former Northeastern faculty member may serve as an outside member of the committee.

## **Comprehensive Examination(s) and/or Proposal Defenses**

Degree programs may require a comprehensive examination(s) and/or an oral defense of the dissertation proposal as the final step before becoming a PhD candidate. The purpose of the comprehensive examination(s) is to test the knowledge and skills of the student in a particular area and their knowledge of recent research developments in the field. The administrative home unit for each PhD program shall establish the process by which comprehensive examination committees are established. Units may require an oral defense of the dissertation proposal in lieu of, or in addition to, a comprehensive examination.

## **Dissertation**

Candidates for the degree of Doctor of Philosophy must complete a dissertation that embodies the results of extended research and makes an original contribution to the field.

## **Oral Defense of the Dissertation**

An oral defense of the dissertation is required and must be held at least 14 calendar days before the degree conferral date. The defense shall be public and conducted with the committee members present either in person or via electronic means. After the public session, a private session may be held to examine material that is subject to a confidentiality agreement. Following the presentation, the candidate will field questions from the committee in public or private. In the case where neither the candidate nor the committee members are present in person on campus (i.e., the candidate and all committee members are connected only remotely via electronic means), there shall be a location established and technology enabled for public, in-person attendance of the defense by the university community and this accommodation made known to the university.

## Submission of the Dissertation

The student must submit the dissertation to ProQuest (or a university-sanctioned successor system) according to the time schedule provided by the relevant graduate office.

## Time Limitation for Achieving Candidacy and Degree Completion

Degree candidacy must be achieved within three years of entering the PhD program, and the PhD degree must be completed within seven years after entering the PhD program. A student may request an extension of these time frames from the graduate office.

## Pursuit of an Academic Credential Outside Student's Major

A student enrolled in a PhD program may seek to pursue academic credentials (e.g., master's degree or certificate) outside of their major only if, prior to completing more than one-third of the required credits for that credential, they obtain the approval of their primary advisor, obtain the approval of the graduate office, and apply to and are accepted into the major offering that credential.

## Regulations and Requirements for Interdisciplinary Graduate Degrees

Northeastern University offers both university- and college-approved interdisciplinary graduate programs for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. The program will correspond in scope and depth to Northeastern's established degree standards but need not agree exactly with the regulations of individual units.

The general regulations and requirements for graduate programs apply to all interdisciplinary programs. Additional requirements are as follows.

Interdisciplinary degrees approved by the Board of Trustees and with curriculum listed in the Graduate Catalog will be administered by a unit designated by the provost. The unit may be within the Office of the Provost or within a college. Faculty oversight of these programs will be through a designated program committee or oversight group. For programs in colleges, the processes followed shall be determined by that unit. For degree programs administered through the Office of the Provost, a faculty group appointed by the provost will provide the faculty oversight.

## Definitions

- "College" refers to the College of Arts, Media and Design; the Bouvé College of Health Sciences; the D'Amore-McKim School of Business; the Khoury College of Computer Sciences; the College of Engineering; the College of Professional Studies; the College of Science; the College of Social Sciences and Humanities; the School of Law; and Mills College at Northeastern.
- "Graduate office" refers to either the designated graduate administration office in a college (as defined above) or an equivalent academic and academic support office that exists outside a college that serves the functions of a college-based graduate office.
- "Graduate program" refers to all postbaccalaureate degree, nondegree, and certificate programs and packages of courses offered for graduate credit. Graduate programs shall not include programs or courses that are offered by the School of Law in support of the JD or LLM degree.

## PhD Programs

### Overview

Northeastern University offers the PhD programs listed below. Included in this list are Cross-Disciplinary Science PhD Programs, where students may pursue a PhD program that blends curriculum across two departments in the College of Science, such as psychology with marine and environmental science.

In addition, PhD students are encouraged to pursue additional graduate certificates to enhance their professional development including the Postsecondary (<https://catalog.northeastern.edu/graduate/additional-programs/postsecondary-teaching-graduate-certificate/>) Teaching (<https://catalog.northeastern.edu/graduate/additional-programs/postsecondary-teaching-graduate-certificate/>), Global Doctoral Research (p. 1131), and Experiential PhD Leadership (<https://catalog.northeastern.edu/graduate/phdprograms/experiential-phd/#experientialphdgraduatetext>). The Experiential PhD (p. 201) page has additional information on doctoral opportunities that connect Northeastern to industry, government, and nonprofit partners.

### B

- Bioengineering, PhD (p. 411)
- Biology, PhD (p. 936)
- Biomedical Science, PhD (p. 756)

### C

- Chemical Engineering, PhD (p. 426)
- Chemistry, PhD (p. 946)
- Civil and Environmental Engineering, PhD (p. 441)
- Computer Engineering, PhD (p. 470)

- Computer Science, PhD (p. 338)
- Counseling Psychology, PhD (p. 690)
- Criminology and Justice Policy, PhD (p. 1039)
- Cross-Disciplinary Science PhD Programs (p. 1014) - see available programs below (p. 198)
- Cybersecurity, PhD (p. 374)

## E

- Economics, PhD (p. 1046)
- Electrical Engineering, PhD (p. 476)
- English, PhD (p. 1051)

## H

- History, PhD (p. 1057)
- Human Behavior and Sustainability Sciences, PhD (p. 964)
- Human Movement and Rehabilitation Sciences, PhD (p. 677)

## I

- Industrial Engineering, PhD (p. 533)
- Interdisciplinary, PhD (p. 199)
- Interdisciplinary Design and Media, PhD (p. 239)
- Interdisciplinary Engineering, PhD (p. 418)

## M

- Marine and Environmental Sciences, PhD (p. 960)
- Mathematics, PhD (p. 973)
- Mechanical Engineering, PhD (p. 539)
- Medicinal Chemistry and Drug Discovery, PhD (p. 763)

## N

- Network Science, PhD (p. 344)
- Nursing, PhD (p. 728)

## P

- Personal Health Informatics, PhD (<https://catalog.northeastern.edu/graduate/computer-information-science/health-informatics/personal-health-informatics-phd/>)
- Pharmaceutics and Drug Delivery, PhD (p. 770)
- Pharmacology, PhD (p. 775)
- Physics, PhD (p. 990)
- Political Science, PhD (p. 1062)
- Population Health, PhD (p. 707)
- Psychology, PhD (p. 1011)
- Public Policy, PhD (p. 1074)

## S

- School Psychology, PhD (p. 692)
- Sociology, PhD (p. 1104)

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## Cross-Disciplinary Science PhD Programs

- Human Behavior and Sustainability Sciences, PhD
-

## Graduate Certificates Available to PhD students for Professional Development

- Experiential PhD Leadership
- Global Doctoral Research
- Postsecondary Teaching

### PhD Network

The PhD Network works with Northeastern's colleges to produce career-ready, dynamic researchers with the deep knowledge and real-world skills and literacies they need to shape global and societal solutions—in academia and industry.

At Northeastern, every PhD student has opportunities to acquire experience beyond traditional dissertation research. Exposure to and integration with our many industry and academic partners—through internships, fieldwork, and other collaborations—and in authentic settings—from laboratories, startup companies, and nonprofit institutions—lead to research with greater impact and broader career opportunities, both within and beyond academia. The PhD Network works with internal and external partners to grow and facilitate opportunities for PhD students.

Shared values unite PhD-centered activities at Northeastern:

- **Excellence with purpose:** All PhD programs combine academic rigor with societal impact, preparing critical thinkers to tackle the world's most challenging problems.
- **Innovative thinking:** Our education programs, mentoring activities, and research scholarship develop novel content and pathfinding approaches.
- **Crossing boundaries:** PhD students transcend disciplinary and international boundaries during their innovative educational journey.
- **Integrative education:** The integration of scholarship and research training with collaborative fieldwork and professional development provides a uniquely experiential education.
- **Inclusive diversity:** Students and faculty from diverse cultures and backgrounds drive excellence by bringing a wide range of perspectives to our distinctive programs.

Explore the PhD Network website (<https://phd.northeastern.edu/network/resources/>) to learn more about:

- Resources that support PhD students' educational, professional, and personal lives
- Events created especially for PhD students, both at Northeastern and through our partners
- Funding in support of fellowships, internships, and conference attendance

### Interdisciplinary PhD - Overview

Offering an individually tailored program of study, the Northeastern University Interdisciplinary Doctor of Philosophy program enables students to draw from the disciplines supporting their fields of research and provides flexibility to train the next generation of transdisciplinary and multidisciplinary researchers who will be needed to tackle society's most pressing problems that cross disciplinary boundaries.

The graduate group, consisting of faculty from across Northeastern, provides the overarching faculty oversight to the curriculum that is expected to cross multiple Northeastern colleges. The Interdisciplinary PhD option will only be available when the desired research curriculum cannot be supported by one of Northeastern's existing PhD programs. This PhD program is administered by the Office of the Provost.

Minimum academic standards, oversight, requirements, and milestones related to this new PhD are described below.

#### GRADUATE GROUP

This refers to the faculty committee that will provide academic oversight for the PhD program as a whole.

#### DISSERTATION COMMITTEE

Established by the graduate group for each PhD student, the dissertation committee consists of at least three faculty qualified to supervise the student's research and establishes the curriculum requirements in support of the PhD student's anticipated dissertation research. There should be at least one dissertation committee member representing each discipline associated with the proposed PhD, and it is strongly encouraged that an external individual is added as a fourth member of the dissertation committee. This external member must be qualified to supervise and guide PhD-level research. The dissertation committee also establishes the milestone requirements, specifically the format for the qualifying exam at the time of admission. One member of the dissertation committee will serve as the committee chair. Cochairs are permitted and encouraged to guide research at the intersection of disciplines.

#### AREA OF SPECIALIZATION

Students select an area of specialization, supported by their approved coursework and research areas and denoted on the student's transcript. The area of specialization will be recommended by the dissertation committee. The graduate group will review these areas of specialization within the context of existing PhD specializations. The graduate group will make the final decision about the area of specialization for each student. Area of specialization should be established by the end of the first year of academic study.

## ADMISSION TO CANDIDACY

The admission to candidacy recognizes the wide range of disciplines that may participate in this degree. To reach candidacy, PhD students must demonstrate their research ability through the application and synthesis of skills and knowledge and their ability to pose questions and solve problems. Students should achieve candidacy by the end of the second year of study. The admission to candidacy will include an assessment about the candidate's ability to perform societally impactful research by an external evaluator. Students who require more than 18 months to meet the requirements for candidacy will need to petition the dissertation committee and the graduate group to request extended time. Candidacy will be achieved with the following:

- The qualifying examination subject areas will be established at the time of admission, which will be aligned with the student's proposed research project. A representative from the graduate group will convene the dissertation committee for the qualifying exams. To assess the student's ability to perform impactful research, it is strongly recommended that an evaluator outside Northeastern (and not a member of the dissertation committee) be included as an examiner. The qualifying examination will normally include a written exam, oral exam, response to a journal paper, and/or other format deemed acceptable by the dissertation committee for the involved disciplinary areas.
- Progression to candidacy may also require a research paper requirement. Any paper requirements will be communicated at admission.
- The committee may require a presentation from the student before making its recommendation.

## DISSERTATION PROSPECTUS/PROPOSAL

After the student has achieved sufficient depth in a field of study, the student prepares a proposal for a PhD dissertation. This process should take place within a year of achieving candidacy. The dissertation proposal describes the proposed research, including the relevant background materials from literature. The proposal should clearly specify the research questions to be addressed, the methods to be used, and a schedule of milestones to completion. A representative from the graduate group will convene the dissertation committee for the dissertation proposal. The dissertation proposal must be approved by the dissertation committee. It is strongly encouraged that the dissertation committee include an individual qualified to guide the research from outside Northeastern. Upon approval of the written proposal, the student must present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The dissertation committee will submit the dissertation proposal results to the representative from the graduate group who will review and communicate the results to the student. The student may take the dissertation proposal examination twice, at most.

## DISSERTATION DEFENSE

The dissertation defense is held in accordance with the bylaws of the University Graduate Curriculum Committee of the Northeastern Faculty Senate. The defense is convened by a representative from the graduate group and is chaired by a Northeastern faculty member approved by the graduate group and outside the dissertation committee. The dissertation committee will include an external examiner who is an individual with expertise in the area of study but not affiliated with the Northeastern global campus system or previously involved with the student's research. The defense chair will communicate the results to the PhD candidate.

## Interdisciplinary PhD - Bachelor's Degree Entry

### Program Requirements for Bachelor's Degree Entry

#### Milestones

Core requirements (*curricula established by the dissertation committee*)

Annual progress review

Admission to candidacy

Qualifying examination

Dissertation prospectus/proposal

Dissertation defense

#### Core Requirements

Code	Title	Hours
	Complete 30 semester hours of coursework in consultation with your dissertation committee.	30

The dissertation committee will provide oversight in coursework selection, provided that each student has training (via courses or experience) in prerequisite domain knowledge, research methods, and specific contexts. Students are required to enroll in a minimum of 30 semester hours of coursework approved by the dissertation committee. This coursework may include traditional courses, special topics courses, independent study, and discussant or other coursework taken via partner institution. The coursework should also include opportunities to develop the professional skills (such as communication, teaching, and leadership) required for the student's field of research. Courses delivered at a partner outside Northeastern University may satisfy these course requirements provided an education or experiential PhD agreement exists with that organization. The dissertation committee will ensure that the 30 semester hours represent a balance of coursework across domain knowledge, research methods, application contexts, research integrity, colloquia, the research itself, and professional development. The dissertation committee should submit a plan of study to the graduate group during the first semester of a PhD student's enrollment.

#### Program Credit / GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## **Interdisciplinary PhD - Master's Degree Entry**

### **Program Requirements for Master's Degree Entry**

#### **Milestones**

Core requirements (*curricula established by the dissertation committee*)

Annual progress review

Admission to candidacy

Qualifying examination

Dissertation prospectus/proposal

Dissertation defense

#### **Core Requirements**

Code	Title	Hours
	Complete 12 semester hours of coursework in consultation with your dissertation committee.	12

The dissertation committee will provide oversight in coursework selection, provided that each student has training (via courses or experience) in prerequisite domain knowledge, research methods, and specific contexts. Students are required to enroll in a minimum of 12 semester hours of coursework approved by the dissertation committee. This coursework may include traditional courses, special topics courses, independent study, and discussant or other coursework taken via partner institution. The coursework should also include opportunities to develop the professional skills (such as communication, teaching, and leadership) required for the student's field of research. Courses delivered at a partner outside Northeastern University may satisfy these course requirements provided an education or experiential PhD agreement exists with that organization. The dissertation committee will ensure that the 12 semester hours represent a balance of coursework across domain knowledge, research methods, application contexts, research integrity, colloquia, the research itself, and professional development. The dissertation committee should submit a plan of study to the graduate group during the first semester of a PhD student's enrollment.

#### **Program Credit / GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

### **Experiential PhD**

#### **Overview**

The future of research will be collaborative. Researchers across academic institutions, industry, government, and other organizations will team up to solve complex real-world problems. Researchers will require technical proficiency as well as the ability to work with others, form teams, manage projects, and more—skills that go beyond the classroom. At Northeastern University, every PhD student and postdoctoral research associate has opportunities to acquire experiences beyond traditional research. Exposure to and integration with our many partners through unique programs in authentic settings from laboratories to startup companies to nonprofit institutions leads to greater impact and broader career opportunities, both within and beyond academia.

The LEADERs Program (p. 202) is designed to enable researchers to develop professional skills through authentic career exploration opportunities at organizations in industry, government, and the nonprofit sector. Beyond the comfort zone of their own university research group, PhD students and postdoctoral research associates encounter new experiences that help shape their research perspective. They also bring fresh ideas and talent to their host organizations. Northeastern is one of the only universities in the world to offer students in all of its research-based doctoral-degree programs the option to learn and pursue research outside of their primary research group. These real-world placements are highly flexible and customizable, tailored to meet the needs of both Northeastern's PhD students and postdoctoral research associates and our institutional partners.

The Industry PhD (p. 202) is a first-of-its kind research-based doctoral program for full-time master's-level employees. Designed with input from external partners, employees pursue a research-based doctoral degree while maintaining their job and conducting research at the employer site. This enables employees to acquire new skills that will help them to advance in their careers and provides the organization with an opportunity to invest in their future leaders. By working closely with Northeastern faculty, employees will explore their research from a broader scientific perspective, enabling them to appreciate the research foundation of their day-to-day work and to pursue new areas of research for the company.

Experiential PhD opportunities offer robust benefits to both students and institutional partners. Students solve complex problems as part of their education and chart careers as future innovators. Our institutional partners receive many benefits as well, including:

- A deeper engagement in rapidly evolving fields of research
- Access to university facilities and senior faculty expertise
- Opportunities for senior leadership to mentor and copublish with students and to serve on their dissertation committees
- A chance to recruit emerging talent

- Opportunities to partner with Northeastern, an entrepreneurial research university known for its innovative collaborations with academia, government, and industry

## Experiential PhD Leadership, Graduate Certificate

At Northeastern University, PhD students and postdoctoral researchers enjoy a uniquely broad range of immersive opportunities to expand critical inquiry, learn, perform original research, and chart a path to professional success. Experiential PhD opportunities enable PhD students to step outside the comfort zone of their campus research group where students can pursue challenging, creative, customized assignments within industry, government, or the nonprofit sector that inform and enhance their pursuit of a research doctorate. Experiential PhD gives postdoctoral researchers the opportunity to bring new skills to their positions at Northeastern.

This Graduate Certificate in Experiential PhD Leadership aims to:

- **Challenge students to address complex problems** through experience within the context of real-world needs and challenges faced by industry, government, or nonprofit-sector organizations, broadening students' view of stakeholders and impact, shaping the very questions they raise and answer.
- **Equip students for a lifetime with the cultural agility, creativity, and professional skills**—public speaking and communications, meeting goals and expectations (e.g., project management for personal and professional purposes), teamwork, leadership, peer influence, leading from the middle—that they will need to translate their findings into impactful solutions.
- **Enrich every student's research group and, ultimately, fields of expertise** by fostering a collaborative, entrepreneurial, innovative approach to knowledge creation that expands their network far beyond academia to include intellectual and professional mentors and collaborators.

This graduate certificate designed for PhD students across all of Northeastern's research-based PhD programs provides students embarking on an experiential PhD, as well as postdoctoral researchers working in an area within one of Northeastern's research-based programs, with the preparation, project delivery, and guidance for contextual integration within the context of leadership development. All students pursuing this leadership certificate will be mentored by their sponsor supervisor and dissertation advisor(s).

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in each course.

### Requirements

Code	Title	Hours
PHDL 7600	Leading Self and Others	4
PHDL 7660	Experiential PhD Challenge Project 1	4
PHDL 7662	Experiential PhD Challenge Project 2	4
PHDL 7666	Contextual Integration	0

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Industry PhD

The Industry PhD is a first-of-its kind research-based doctoral program designed with input from external partners to provide a pathway for full-time master's-level employees. Designed with input from external partners, employees pursue a research-based doctoral degree while maintaining their job and conducting research at the employer site. This enables employees to acquire new skills that will help them to advance in their careers and provides the organization with an opportunity to invest in their future leaders. By working closely with Northeastern University faculty, employees will explore their research from a broader scientific perspective, enabling them to appreciate the research foundation of their day-to-day work and to pursue new areas of research for the company.

Experiential PhD programs offer robust benefits to both students and institutional partners. Students solve complex problems as part of their education and chart careers as future innovators. Our institutional partners receive many benefits as well, including:

- A deeper engagement in rapidly evolving fields of research
- Access to university facilities and senior faculty expertise
- Opportunities for senior leadership to mentor and copublish with students and to serve on their dissertation committees
- A chance to recruit emerging talent
- Opportunities to partner with Northeastern, an entrepreneurial research university known for its innovative collaborations with academia, government, and industry

The Industry PhD is applicable to any of our 35 doctoral programs. Applicants should follow the requirements of the program to which they are applying. In addition, the following Industry PhD terms (<https://phd.northeastern.edu/industry-and-experiential-phd-program/>) apply.

## College of Arts, Media and Design

Website (<https://camd.northeastern.edu/>)

**Elizabeth Hudson, PhD**, Dean

**Casper Harteveld, PhD**, Associate Dean for Graduate Programs

**Michael Hopmann, PhD**, Associate Dean for Undergraduate Programs

**Deirdre Loughridge, PhD**, Associate Dean of Faculty Affairs

**Thomas Michael, MBA**, Associate Dean for Administration and Finance

**Andrea Raynor, MFA**, Associate Dean for Network, Global Experience, and Partner Programs

**Brooke Welles, PhD**, Associate Dean of Research

**Timothy Blank, MA**, Assistant Dean of Student Experience

**Katherine Calzada, MEd**, Assistant Dean for Faculty Development

**Ian Canning, MBA**, Assistant Dean for Mobility, Executive, and Partner Programs

**Emily Goodmann, PhD**, Assistant Dean of Creative Technologies

**Rachel Moo, MBA**, Assistant Dean for Diversity, Equity, and Inclusion

617.373.3682

617.373.5084 (fax)

*Graduate Enrollment and Student Services*

617.373.5329 or 617.373.2566

[gradcamd@northeastern.edu](mailto:gradcamd@northeastern.edu)

The College of Arts, Media and Design offers graduate programs that build on existing knowledge and establish innovative areas of inquiry and practice. We work with students to frame, research, and answer transformative questions. Together, we challenge, engage, and shape global cultures and marketplaces.

### Our Mission

We create a distinctive experiential education by leveraging emergent practices and scholarship in the arts, media, and design. Our unique combination of disciplines empowers innovative thinking and making. Our students become informed citizens and creative leaders with an entrepreneurial spirit.

### Graduate Studies in the College of Arts, Media and Design

Welcome to graduate studies at CAMD. We deliver an outstanding graduate education in traditional areas while exploring new approaches to this generation's transformative questions. Our graduate programs highlight intersectional approaches that bring together human, technological, and data literacies to push the boundaries of our disciplines.

We offer diverse program types to meet individual career and academic goals, including terminal degrees (Doctor of Philosophy, Master of Fine Arts, Master of Architecture); professional degrees (Master of Science, Master of Arts, Master of Design); PlusOne pathways; and Graduate Certificates. Our graduate degree programs are inherently interdisciplinary, led by research faculty across the departments of Art + Design, architecture, journalism, music, and theatre. Coursework incorporates a range of scholarly, applied, and experiential perspectives, complemented by lively community activities including lecture series, exhibitions, symposia, and more.

This is an exciting time to pursue advanced education and scholarship in creative fields. Never have the arts and culture been so clearly essential to our social, economic, and environmental future: From cultural outreach in underserved communities to designing ethical virtual environments for health and security; from green building innovation to cutting-edge journalism; from provocative performances and thought-provoking installations to incisive data visualizations that change how we view the world—our faculty and students are involved in a wealth of academic endeavors, creative enterprises, and professional experience.

Please use these resources to familiarize yourself with the diverse ranges of programs we offer. Don't hesitate to reach out to the graduate program faculty listed in your fields of interest, and be sure to visit CAMD's graduate programs website (<https://camd.northeastern.edu/graduate-students/>) often, where you'll find current news and links.

## Academic Policies and Procedures

- General Information (p. 204)
- Graduate Student Classification (p. 204)
- Master's Degree Policies (p. 204)

### General Information

Four units in the College of Arts, Media and Design offer programs at the graduate level:

- Architecture (p. 205)
- Art + Design (p. 219)
- Journalism (p. 234)
- Interdisciplinary (p. 238)

### Graduate Student Classification

#### Regular Student

Those students who are admitted to a degree program.

#### Conditional Student

Students whose admissions files are missing documentation. A student who has not provided required documentation for admission by the due date for final grades for the student's first academic term will not be permitted to register for a future term.

#### Special Student

Special students are enrolled on a part-time basis (no more than 6 semester hours per semester). Credit can be earned for a maximum of 12 semester hours over time. Students interested in taking more than 12 semester hours must make a formal application to the degree program through Northeastern University's online application portal (<https://camd.northeastern.edu/apply/>). Special students who do not register for four consecutive semesters (excluding summer semester) will be subject to review and possible withdrawal by CAMD graduate studies.

#### Student Status

For academic purposes, a graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester, with the following exceptions:

- A student is considered full time if enrolled in a full-time co-op (p. 188).
- Students enrolled in PhD program Dissertation or PhD program Dissertation Continuation are considered full time.

*Note:* Full-time status may be defined differently for federal loan purposes. For information, contact Student Financial Services (<https://studentfinance.northeastern.edu/>), 617.373.5899.

### Master's Degree Policies

The College of Arts, Media and Design graduate studies sets minimum standards for all students to fulfill. In addition, departments and programs may have requirements that exceed the standards outlined below.

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and such other study as may be required by the department in which the student is registered. To qualify for the degree, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be terminated from the program.

To maintain current student status within CAMD, graduate students must make satisfactory progress in their degree, including working toward the graduation requirement of a GPA of 3.000 and the timely completion of coursework. See the university policy Minimum Cumulative GPA (p. 190).

All students must be registered in the last semester of their program. Any student who does not attend Northeastern University for a period of one year will be required to apply for readmission.

#### Electives

No more than 8 semester hours of electives may be taken outside of CAMD. Any additional non-CAMD elective hours will not count toward the degree.

## Graduate Student Scholarship

Students who are registered in degree programs are eligible for a CAMD Graduate Student Scholarship. Award recipients will receive an official award letter from CAMD graduate studies. Pay attention to this letter as it is an official contract that should be read carefully. The GSS is contingent on satisfactory academic progress toward the degree and meeting department-specific guidelines. Recipients must be in full-time status and be registered for a minimum of 8 semester hours. Note, however, that recipients remain eligible for the GSS in their final semester even if they are enrolled in less than 8 semester hours. Receipt of financial support administered by CAMD graduate studies requires that all students receiving awards must maintain a 3.000 cumulative GPA. Students whose cumulative GPA is below 3.000 will be placed on academic probationary status and are not eligible to receive the award while on probation. The GSS can be reactivated by raising the cumulative GPA to 3.000 in the subsequent semester; students who do not meet the minimum GPA requirement at the end of the next semester cannot receive additional probationary periods.

## Leave of Absence

Full-time students who are not involved in any academic endeavor for a period of time are required to petition the manager of student services, through their department, for a leave of absence (p. 177) by completing the leave of absence petition through the Student Hub (<https://me.northeastern.edu>). CAMD graduate studies will not accept retroactive leave requests. Note that if a student is requesting a leave for medical reasons, students should contact University Health and Counseling Services (<https://uhcs.northeastern.edu/>) at 617.373.2772. Leaves of absence generally are not approved for more than one calendar year at a time. International students must consult with an advisor at the Office of Global Services (<https://international.northeastern.edu/ogs/>) for proper guidance. Leaves of absence are not appropriate for master's degree students who are working on a thesis but are away from the Northeastern campus. Except in the case of medical leaves, being on an approved leave of absence does not extend the amount of time allowed for degree completion or the makeup of incomplete grades.

## Time Limitation

For the master's degree, course credits earned in the program of graduate study are valid for a maximum of seven years.

If a student wishes to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of time-limit extension requests for master's degree coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend approval of the extension to CAMD graduate studies.

## Changes in Requirements

The continuing development of CAMD graduate studies forces regular revision of curricula. When no hardship is imposed on the student because of changes and the facilities (e.g., equipment, technology, studios, etc.) of the college permits, the student is encouraged to meet the more recent program requirements. This requires application to change the catalog term of the student's program of study. To accomplish this, the student's advisor can assist the student with the process of applying to change catalog term. However, if it can be demonstrated that doing so imposes a substantial hardship, the requirements of the year in which the student matriculated will be applicable.

## Thesis

Theses are required in some programs and should demonstrate the individual's capacity to execute independent work based on original material. Registration for the thesis course is required. Theses must be approved by the departmental graduate committee and must receive a grade of B (3.000) or better to be accepted. Students who have not completed their thesis after having registered for the specified number of thesis credits must register and pay for Thesis Continuation.

## School of Architecture

Website (<https://camd.northeastern.edu/architecture/>)

### Daniel Adams, MArch

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## Master of Architecture

Northeastern University offers a Master of Architecture degree accredited by the National Architectural Accrediting Board (<http://www.naab.org>).

The program leverages the school's outstanding faculty and pragmatically grounded curriculum. The physical and cultural context of Boston serves as a laboratory for the program's design studios and is design focused but with a different approach than many schools. We find opportunities for innovation within the real estate and construction industries and current policy debates—rather than outside them. This is how we intend to move architects to the center of the discussion about the future of our cities.

Students take courses in urban housing, practice-integrated design, and do original research on market-driven building types. The final degree project in the design studio offers an opportunity to leverage this research with real innovations in hybrid types, strategic alterations to existing ones, and to take on the challenge of finding prototypical solutions for systemic problems.

In addition to studio courses, graduate students take seminars in architectural theory and design strategy; and electives are available in real estate development, sustainable building techniques, urban landscape, and other topics. There is also a unique course that looks at case studies of

architecture firms in practice, problem solving, and innovation. We seek to have students leave our program with a unique balance of technical, theoretical, and strategic tools to make a real difference in the profession.

## **Master of Design for Sustainable Urban Environments**

The Master of Design for Sustainable Urban Environments (MDes-SUEN) brings together the allied professional fields of environmental design, landscape architecture, and urban planning to offer advanced study and research opportunities in the design of ecologically and economically productive urban environments. The program seeks to supply graduates for the rapidly growing field of sustainable urbanism through a dynamic curricular mix of design, dialogue, and technical courses, enriched by diverse interdisciplinary electives.

The pedagogic and research focus of the MDes is the design, implementation, and management of sustainable urban environments from the scale of individual parcels to regional systems. Key topics include brownfield and waterfront revitalization, sustainable and secure pedestrian environments, urban habitat design and management, and green and blue infrastructure design and planning with an emphasis handling increased stormwater and tidal influx in the urban landscape.

The MDes is a unique program of study in which urban landscape design, planning, and policy dovetail with environmental engineering, environmental science, art, and visualization. Boston's history of innovation in environmental design as well as its legacy of urban redevelopment provide a rich backdrop and laboratory of urban, infrastructural, and ecological prototypes that ideally position the program to creatively and critically explore local issues with global implications.

Contemporary urban theory includes a significant body of writing in the area of "Landscape—" and "Ecological-Urbanism," a critical discourse that looks at the full range of environmental strategies for urban sites with an emphasis on ecological thinking. The paradigm of sustainable environmental design is moving away from form-based planning toward dynamic ecosystem services. This program seeks to prepare students to be innovative and entrepreneurial designers able to combine economic, environmental, and social priorities to make next-generation public spaces and systems.

## **Programs**

### **Master of Architecture (MArch)**

- One-Year Program (p. 206)
- Two-Year Program (p. 207)
- Three-Year Program (p. 210)
- Three-Year Program—Advanced Degree Entrance (p. 214)

### **Master of Design for Sustainable Urban Environments (MDes-SUEN)**

- One-Year Program (p. 217)
- Two-Year Program (p. 218)

### **Master of Architecture—One-Year Program**

This program gives eligible candidates the opportunity to get a NAAB-accredited (<http://www.naab.org>) Master of Architecture degree in one year.

Open to candidates with either a Bachelor of Science in Architecture from Northeastern University or a professional Bachelor of Architecture degree from an accredited North American program with at least one year of IDP-approved professional experience.

Students engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth two-semester professional practice sequence that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Professional Practice</b>		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
<b>Topics and Seminars</b>		
ARCH 6330	Seminar in Modern Architecture	4
ARCH 6340	Graduate Topics in Architecture	4
<b>Research and Project</b>		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

## Elective

Code	Title	Hours
Students must complete a 4-semester-hour graduate elective.		4

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6330	4	ARCH 6340		4 Vacation		0 Vacation	0
ARCH 6430	4	ARCH 6440		4			
ARCH 7130	6	ARCH 7140		6			
Elective (Required)	4						
	18		14			0	0

**Total Hours: 32**

## Master of Architecture—Two-Year Program

This program offers students who have earned a Bachelor of Science in Architecture from an institution other than Northeastern University to engage in the urban-focused curriculum that is offered at the School of Architecture. Students are awarded a MArch degree, which is NAAB-accredited (<http://www.naab.org>).

### Year One

Options Studio offers topical content that best aligns with the research and practice expertise of the faculty, which provides students with the latest concepts in architectural design, theory, and research on a consistently updated and rotating basis. Students select their top choices of studio topics and instructors, giving them more flexibility in the areas for which they would like to focus their education. The Comprehensive Design Studio challenges the students to consider architectural connections at all scales, from the nut and bolt, to the scale of the door or window, to the scale of the whole building and the city. Additionally, students take classes in technology as well as architecture seminars.

### Year Two

In the final year, students engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth two-semester professional practice sequence that analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Building and Environment</b>		
ARCH 5210	Environmental Systems	4
ARCH 5220	Integrated Building Systems	4
<b>Studio</b>		
ARCH 5115	Option Studio	6
ARCH 5120	Comprehensive Design Studio	6
<b>Professional Practice</b>		
ARCH 6430	Case Studies 1	4
ARCH 6440	Case Studies 2	4
<b>Topics and Seminars</b>		
ARCH 5310	Design Tactics and Operations	4
ARCH 6330	Seminar in Modern Architecture	4
ARCH 6340	Graduate Topics in Architecture	4
<b>Research and Project</b>		
ARCH 7130	Master's Research Studio	6
ARCH 7140	Master's Degree Project	6

## Concentrations or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Visualization (p. 208)
- Experience Design (p. 209)
- Extended Realities (p. 209)
- Sustainable Building Systems (p. 209)
- Sustainable Urban Environments (p. 209)
- Urban Analytics (p. 209)
- Urban Studies (p. 209)
- Electives (p. 210)

## Program Credit/GPA Requirements

60 total semester hours required (64 with optional elective)

Minimum 3.000 GPA required

### CONCENTRATION IN DATA VISUALIZATION

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Complete one of the following:		
ARTG 5310	Visual Cognition	4
ARTG 6110	Information Design Theory and Critical Thinking	4
ARTG 6330	Information Design Mapping Strategies	4

**CONCENTRATION IN EXPERIENCE DESIGN**

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Complete one of the following:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

**CONCENTRATION IN EXTENDED REALITIES**

Code	Title	Hours
<b>Required Course</b>		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Complete two of the following:		
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

**CONCENTRATION IN SUSTAINABLE BUILDING SYSTEMS**

Code	Title	Hours
<b>Required Courses</b>		
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Complete one of the following:		
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

**CONCENTRATION IN SUSTAINABLE URBAN ENVIRONMENTS**

Code	Title	Hours
<b>Required Course</b>		
SUEN 6340	Topics in Urban Environmental Design	4
Complete two of the following:		
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

**CONCENTRATION IN URBAN ANALYTICS**

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6330	Information Design Mapping Strategies	4

**CONCENTRATION IN URBAN STUDIES**

Code	Title	Hours
<b>Required Course</b>		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
Complete two of the following:		
LPSC 7312	Cities, Sustainability, and Climate Change	8

SUEN 6340	Topics in Urban Environmental Design
Any 5000-level or higher PPUA course	

**ELECTIVES OPTION**

Code	Title	Hours
<b>Required Electives</b>		
Complete 8 semester hours of non-ARCH courses.		
<b>Optional Elective</b>		
Complete 4 additional semester hours of non-ARCH courses. Electives outside architecture may be taken in consultation with your faculty advisor.		

**Plan of Study****Sample Plan of Study—Electives Option**

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 5115	6	ARCH 5120		6 Vacation		Vacation	
ARCH 5210 and ARCH 5211	4	ARCH 5220		4			
ARCH 5310	4	Elective (2/2)		4			
Elective (1/2)	4	Elective (optional)					
	18		14		0		0

  

Year 2							
Fall	Hours	Spring	Hours				
ARCH 6330	4	ARCH 6340		4			
ARCH 6430	4	ARCH 6440		4			
ARCH 7130	6	ARCH 7140		6			
	14		14				

**Total Hours: 60****Master of Architecture—Three-Year Program**

Open to candidates who do not have a Bachelor of Science in Architecture or equivalent.

Applicants from all disciplines are welcome. Those who have some architecture coursework may be eligible for advanced placement.

The program requires three years of study. Students have the option to pursue a summer co-op opportunity managed by Northeastern University's co-op program.

After completing a first-year introductory curriculum, students in the three-year program merge into the two-year MArch curriculum. This is a NAAB-accredited (<http://www.naab.org>) degree program.

**Year One**

In the first year, students take intensive studios, technology classes, and architectural history classes to immerse them in the studio culture of the school and to give them a strong foundation to begin the upper-level studios. The introductory graduate skills and design studios are specifically designed for the students in this program who do not have experience doing architectural drawing and designing. Students complete a series of projects that will give them an opportunity to develop the skills and the critical thinking needed in the graduate curriculum.

**Year Two**

Students continue to develop their core skills in the Urban Architecture Studio. In the spring semester, the Option Studio offers topical content that best aligns with the research and practice expertise of the faculty, which provides students with the latest concepts in architectural design, theory, and research on a consistently updated and rotating basis. Students select their top choices of studio topics and instructors, giving them more flexibility in the areas for which they would like to focus their education.

**Year Three**

In the final year, the Integration Studio in the fall semester challenges students to consider architectural connections at all scales, from architectural detail, to architectural systems, to the whole building and its urban context. Students also engage in a two-semester research and design project based on pertinent contemporary topics chosen by the graduate faculty, or students may propose an independent research and design project. Team research is conducted and compiled into online and physical research books. This body of compiled research then becomes the basis of the intellectual framework for the individual students' design projects. This final degree project parallels an in-depth professional practice course that

analyzes all of the contingencies of successful architectural projects, including architectural offices and their project management strategies, real estate development criteria, and associated project finance.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>History</b>		
ARCH 2340	Modern Architecture	4
ARCH 5340	Architectural and Urban Histories	4
<b>Building, Design, and Environment</b>		
ARCH 2240	Architectonic Systems	4
ARCH 3450	Advanced Architectural Communication	4
ARCH 5210 and ARCH 5211	Environmental Systems and Recitation for ARCH 5210	4
ARCH 5230 and ARCH 5231	Structural Systems and Recitation for ARCH 5230	4
ARCH 7220	Integrated Building Systems	4
<b>Studio</b>		
ARCH 5115	Option Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6115	Urban Architecture Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
ARCH 7120	Integration Studio	6
<b>Professional Practice</b>		
ARCH 5430	Introduction to Professional Practice in Architecture	4
ARCH 6440	Case Studies 2	4
<b>Topics and Seminars</b>		
ARCH 5310	Design Tactics and Operations	4
ARCH 5330	Theories of Architecture and Urbanism	4
ARCH 6340	Graduate Topics in Architecture	4
<b>Research and Project</b>		
ARCH 7140	Master's Degree Project	6
ARCH 7430	Topics In Research Methods in Architectural Design	4

### Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Visualization (p. 212)
- Experience Design (p. 212)
- Extended Realities (p. 212)
- Sustainable Building Systems (p. 212)
- Sustainable Urban Environments (p. 212)
- Urban Analytics (p. 213)
- Urban Studies (p. 213)
- Electives (p. 213)

**Program Credit/GPA Requirements**

100 total semester hours required (108 with optional electives)

Minimum 3.000 GPA required

**Concentration in Data Visualization**

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Complete one of the following:		
ARTG 5130	Visual Communication for Information Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

**Concentration in Experience Design**

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Complete one of the following:		
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

**Concentration in Extended Realities**

Code	Title	Hours
<b>Required Course</b>		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Complete two of the following:		
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

**Concentration in Sustainable Building Systems**

Code	Title	Hours
<b>Required Courses</b>		
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Complete one of the following:		
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
SBSY 5250	Building Performance Simulation	
SBSY 5300	Information Systems for Integrated Project Delivery	

**Concentration in Sustainable Urban Environments**

Code	Title	Hours
<b>Required Course</b>		
SUEN 6340	Topics in Urban Environmental Design	4
Complete two of the following:		
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	

SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

### Concentration in Urban Analytics

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6330	Information Design Mapping Strategies	4

### Concentration in Urban Studies

Code	Title	Hours
<b>Required Course</b>		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
Complete two of the following:		8
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6340	Topics in Urban Environmental Design	
Any 5000-level or above PPUA course		

### Electives Option

Code	Title	Hours
<b>Required Electives</b>		
Complete 12 semester hours of non-ARCH courses.		12
<b>Optional Electives</b>		
Complete 8 semester hours of ARCH courses (optional). Electives outside architecture may be taken in consultation with your faculty advisor.		8

### Plan of Study

#### Sample Plan of Study—Electives Option

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6100	6	ARCH 6200		6 Vacation		Vacation	
ARCH 2240	4	ARCH 2340 and ARCH 2341		4			
ARCH 5340	4	ARCH 3450 (or required elective)		4			
Elective (1/3)	4	Elective (2/3)		4			
	18		18		0		0

  

Year 2							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
ARCH 6115	6	ARCH 5115		6 Vacation		Vacation	
ARCH 5310	4	ARCH 5430		4			
ARCH 5210 and ARCH 5211	4	ARCH 5330		4			
Elective (3/3)	4	ARCH 5230 and ARCH 5231		4			
	18		18		0		0

  

Year 3							
Fall	Hours	Spring	Hours				
ARCH 7120	6	ARCH 7140	6				
ARCH 7220	4	ARCH 6440	4				
ARCH 7430	4	ARCH 6340	4				

Elective (optional)	Elective (optional)
14	14
<b>Total Hours: 100</b>	

### Master of Architecture—Three-Year Program—Advanced Degree Entrance

The Master of Architecture, Three-Year Program with Advanced Entry is open to applicants who have not earned a Bachelor of Science in Architecture or an equivalent degree but have some background in architectural studies or engineering. The program carries the same requirements as the Master of Architecture, Three-Year Program except that 4–20 semester hours of first-year coursework will be waived at the discretion of the program director, in consultation with program faculty members, based on the applicant's prior coursework, academic transcript, and portfolio or work samples.

This is an NAAB-accredited (<http://www.naab.org/>) degree program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Foundation Courses

Students may be required to complete up to 16 semester hours of foundation coursework as determined by the program advisor, based on the applicant's prior coursework, academic transcript, and portfolio or work samples. Waivers are determined by the faculty; students should consult with their advisors.

Code	Title	Hours
<b>History</b>		
ARCH 2340	Modern Architecture	4
ARCH 5340	Architectural and Urban Histories	4
<b>Building, Design, and Environment</b>		
ARCH 2240	Architectonic Systems	4
ARCH 5210	Environmental Systems	4
ARCH 5230	Structural Systems	4

### Core Requirements

Code	Title	Hours
<b>Building, Design, and Environment</b>		
ARCH 3450	Advanced Architectural Communication	4
ARCH 7220	Integrated Building Systems	4
<b>Studio</b>		
ARCH 5115	Option Studio	6
ARCH 6100	Graduate Skills Studio	6
ARCH 6115	Urban Architecture Studio	6
ARCH 6200	Graduate Studio 1: Architectural Design	6
ARCH 7120	Integration Studio	6
<b>Professional Practice</b>		
ARCH 5430	Introduction to Professional Practice in Architecture	4
ARCH 6440	Case Studies 2	4
<b>Topics and Seminars</b>		
ARCH 5310	Design Tactics and Operations	4
ARCH 5330	Theories of Architecture and Urbanism	4
ARCH 6340	Graduate Topics in Architecture	4
<b>Research and Project</b>		

ARCH 7140	Master's Degree Project	6
ARCH 7430	Topics In Research Methods in Architectural Design	4

## Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Visualization (p. 215)
- Experience Design (p. 215)
- Extended Realities (p. 215)
- Sustainable Building Systems (p. 215)
- Sustainable Urban Environments (p. 216)
- Urban Analytics (p. 216)
- Urban Studies (p. 216)
- Electives Option (p. 216)

## Program Credit/GPA Requirements

80–96 total semester hours required

Minimum 3.000 GPA required

### Concentration in Data Visualization

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
Complete one of the following:		
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

### Concentration in Experience Design

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
Complete one of the following:		
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

### Concentration in Extended Realities

Code	Title	Hours
<b>Required Course</b>		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
Complete two of the following:		
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	

### Concentration in Sustainable Building Systems

Code	Title	Hours
<b>Required Courses</b>		
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Complete one of the following:		

CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
SBSY 5250	Building Performance Simulation
SBSY 5300	Information Systems for Integrated Project Delivery

## Concentration in Sustainable Urban Environments

Code	Title	Hours
<b>Required Course</b>		
SUEN 6340	Topics in Urban Environmental Design	4
Complete two of the following:		8
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	

## Concentration in Urban Analytics

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6330	Information Design Mapping Strategies	4

## Concentration in Urban Studies

Code	Title	Hours
<b>Required Course</b>		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
Complete two of the following:		8
LPSC 7312	Cities, Sustainability, and Climate Change	
SUEN 6340	Topics in Urban Environmental Design	
Any 5000-level or above PPUA course		

## Electives Option

Code	Title	Hours
<b>Required Electives</b>		
Complete 12 semester hours of non-ARCH courses (required).		12
<b>Optional Electives</b>		
Complete up to 8 additional semester hours.		8

## Plan of Study

### Sample Plan of Study

All students in this program must complete a minimum of 8 semester hours per semester in the first year.

*Note:* This sample plan of study presumes that the Modern Architecture (ARCH 2340) and Recitation for ARCH 2340 (ARCH 2341) requirements of the Master of Architecture, Three-Year Program have been waived based on the applicant's prior coursework and portfolio or work samples. These two courses would otherwise be completed in Year 1 spring in the standard Master of Architecture, Three-Year program. Given the waiver of those requirements, the student will complete the Master of Architecture, Three-Year Program with Advanced Entry at 96 semester hours of study, in comparison to the 100 semester hours of study required for the Master of Architecture, Three-Year Program.

Year 1			
Fall	Hours	Spring	Hours
ARCH 2240		4 ARCH 3450	4
ARCH 5340		4 ARCH 6200	6
ARCH 6100		6 Elective (2/3)	4
Elective (1/3)		4	

<b>Year 2</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
ARCH 5210 and ARCH 5211		4 ARCH 5115	6
ARCH 5310		4 ARCH 5330	4
ARCH 6115		6 ARCH 5430	4
Elective (3/3)		4 ARCH 5230 and ARCH 5231	4
		<b>18</b>	<b>18</b>

  

<b>Year 3</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
ARCH 7120		6 ARCH 6340	4
ARCH 7220		4 ARCH 6440	4
ARCH 7430		4 ARCH 7140	6
Elective (optional)		Elective (optional)	
		<b>14</b>	<b>14</b>

**Total Hours: 96**

### Sustainable Urban Environments, MDes—One-Year Program

The one-year Master of Design for Sustainable Urban Environments (MDes-SUEN) is open to students holding an accredited, first-professional degree in landscape architecture, architecture, planning, or urban design. The 36-credit program offers a core sequence of advanced design research studios, proseminars, and urban ecology and technology workshops complemented by interdisciplinary electives.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Studio</b>		
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
<b>Proseminar</b>		
Complete 8 semester hours from the following (repeatable) courses:		
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	8
SUEN 6340	Topics in Urban Environmental Design	
<b>Technology</b>		
SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

### Electives

Electives in other disciplines may be taken in consultation with your faculty adviser.

<b>Code</b>	<b>Title</b>	<b>Hours</b>
Complete 8 semester hours from the following subject areas:		
SUEN, ARCH, LARC, PPUA, LPSC, and SBSY		8

## Program Credit/GPA Requirements

36 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

Year 1				
Fall	Hours	Spring	Hours	
SUEN 7130		6 SUEN 7140 (or co-op*)	6	
SUEN 7230		4 SUEN 7240	4	
SUEN 7320 or 6340		4 SUEN 7320	4	
Elective (required)		4 Elective (required)	4	
		18		18

Total Hours: 36

\*Students may opt to do a graduate co-op. Co-op does not count toward degree credits.

## Sustainable Urban Environments, MDes—Two-Year Program

The two-year Master of Design for Sustainable Urban Environments (MDes-SUEN) is open to students entering with a bachelor's degree in any field. The 64-credit program provides a full year of core skill sets including design; site analysis, implementation, and visualization; history/theory; and policy. This includes introduction to basic earthworks, water, and plants systems as well as the principles of landscape and urban ecology.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Studio</b>		
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	6
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6
SUEN 7130	Master's Research Studio: Design and the Resilient City	6
SUEN 7140	Master's Research Studio: Master's Project	6
<b>Cities: Design and Planning</b>		
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	4
LPSC 7312	Cities, Sustainability, and Climate Change	4
<b>Proseminar</b>		
Complete 8 semester hours from the following (repeatable) courses:		8
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	4
SUEN 6340	Topics in Urban Environmental Design	4
<b>Technology</b>		
SUEN 6210	Implementation and Visualization for Urban Environments 1	4
SUEN 6220	Implementation and Visualization for Urban Environments 2	4
SUEN 7230	Urban Ecologies and Technologies 1	4
SUEN 7240	Urban Ecologies and Technologies 2	4

## Electives

Electives in other disciplines may be taken in consultation with your faculty adviser.

Code	Title	Hours
Complete 8 semester hours from the following subject areas:		8
SUEN, ARCH, LARC, PPUA, LPSC, SBSY		

## Program Credit/GPA Requirements

64 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
SUEN 6110	6	SUEN 6120	6	Vacation	0	Vacation	0
SUEN 6210	4	SUEN 6220	4				
SUEN 6310	4	LPSC 7312	4				
Elective (Required)	4	Elective (Required)	4				
	18		18		0		0

  

Year 2							
Fall	Hours	Spring	Hours				
SUEN 7130	6	SUEN 7140 (or co-op)*	6				
SUEN 7320 (or)	4	SUEN 7320	4				
SUEN 6340		SUEN 7240	4				
SUEN 7230	4	Elective (Optional)	4				
Elective (Optional)	4						
	18		18				

**Total Hours: 72**

\*Note: Students may opt to do a graduate co-op. Co-op does not count toward degree credits.

Total credits required are 64 (with two optional electives, 72).

## Art + Design

Website (<https://camd.northeastern.edu/graduate-overview/>)

**Dietmar Offenhuber, PhD**

Chair

**Julia Hechtman, MFA**

Associate Chair

617.373.4340

The graduate programs in the Department of Art + Design are designed to cultivate capacity and fluency in a range of disciplines and practices to create and deliver value and benefit for an increasingly connected and diverse world. Spanning many subjects, interests, and intentions across disparate fields and manifold practices of art, media, and design, our master's and certificate programs will challenge and inspire you to push the boundaries of cultural production and stewardship and social and civic impact. We strive to empower you to bring your ideas to life through design conversations, media making, and artistic expression and enjoy richly rewarding careers and lives.

## Programs

### Master of Fine Arts (MFA)

- Experience Design (p. 220)
- Information Design and Data Visualization (p. 221)

### Master of Science (MS)

- Experience Design (p. 224)
- Game Science and Design (p. 226)
- Information Design and Data Visualization (p. 228)
- Media Innovation and Data Communication (p. 229)

## Graduate Certificate

- Experience Design (p. 231)
- Game Experience Design (p. 232)
- Game Science (p. 233)
- Information Design and Visualization (p. 233)

## Experience Design, MFA

The Master of Fine Arts in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The experience design program moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a real context in relation to emerging technologies, the Master of Fine Arts in Experience Design allows graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students study how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Master of Fine Arts in Experience Design seeks to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates should be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Core</b>		
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 5640	Prototyping for Experience Design	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4
ARTG 6700	Design Studio 3: Synthesis	4
<b>Thesis</b>		
ARTG 7100	Critical Design and Research Seminar	4
ARTG 7910	Design Project and Exhibition	4
ARTG 7990	Thesis	4

## Electives

Code	Title	Hours
Complete 16 semester hours of elective courses, such as these, in consultation with your advisor (multiple completions of ARTG 5000 may apply toward the elective requirement):		16
ARTG 5000	Topics in Design	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5710	Design for Dignity	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	

## Program Credit/GPA Requirements

60 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Sample Plan of Study: Two Years, One (Optional) Co-op

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 5600		4 ARTG 5610		4 Co-op or vacation	
ARTG 5120		4 ARTG 6310		4	
ARTG 5620		4 ARTG 6600		4	
ARTG 5640		4 Elective		4	
	16			16	0

  

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
ARTG 6700		4 ARTG 7100		4	
Elective		4 ARTG 7910		4	
Elective		4 ARTG 7990		4	
Elective		4			
	16			12	

**Total Hours: 60**

## Information Design and Data Visualization, MFA

The Master of Fine Arts in Information Design and Data Visualization program uniquely combines design training and analytical methods with distinctive approaches to theoretical, visual, and technical aspects of visual communication. Successful graduates gain expertise in the visual and technological languages of data, applying modes of visual cognition, and using analytics tools to create interactive, data-driven communication and installations.

This design-centric program seeks to prepare graduates to collaborate across a variety of fields and settings, crossing the bridge between technology, public communication, and systems design. Successful graduates are prepared to be professional information designers and data visualization experts in design agencies, research institutions, industry, and public institutions, able to lead and collaborate in this dynamic and burgeoning interdisciplinary field of practice and research. Students also are well positioned to pursue PhDs and academic careers. Students have the unique advantage of studying at a major research university known for interdisciplinary collaboration located in Boston—a global center for technology, science, education, and culture—offering diverse opportunities for practice and research in information design and data visualization.

The MFA-IDDV curriculum includes studio courses and seminars in graphic, information, and interaction design; creative inquiry; research methodologies; data literacies; and visualization technologies. It integrates faculty instruction with visiting artists and researchers. The degree requires 60 credit hours over two academic years, with an option to engage in Northeastern's renowned co-op program. A thesis project, a written thesis, and an accompanying work exhibition in the thesis show are required.

Learn more about IDDV projects, students, and faculty at [Information Design and Data Visualization \(http://northeastern.edu/visualization/\)](http://northeastern.edu/visualization/).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Studio</b>		
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6700	Design Studio 3: Synthesis	4
<b>Theory and Research Methods</b>		
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6110	Information Design Theory and Critical Thinking	4
<b>Design and History</b>		
ARTG 5110	Information Design History	4
ARTG 5130	Visual Communication for Information Design	4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
<b>Thesis</b>		
ARTG 7100	Critical Design and Research Seminar	4
ARTG 7910	Design Project and Exhibition	4
ARTG 7990	Thesis	4

### Electives

Code	Title	Hours
In consultation with faculty advisor, complete two courses from the following (one of the electives can be chosen from any Northeastern graduate courses; multiple completions of ARTG 5000 may apply toward the elective requirement):		
ARTG 5000	Topics in Design	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 5710	Design for Dignity	
ARTE 5901	Special Topics in Art and Design Studio	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6555	Graphic Design Synthesis	
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	
JRNL 6341	Telling Your Story with Data	

### Program Credit/GPA Requirements

60 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Sample Two Years, Optional Summer Co-op**

Year 1		Spring		Summer Full Semester	
Fall	Hours		Hours		Hours
ARTG 5100		4 ARTG 5310		4 Co-op or vacation	0
ARTG 5130		4 ARTG 5330		4	
ARTG 5150		3 ARTG 6100		4	
ARTG 5151		1 ARTG 6110		4	
ARTG 5320		4			
		16		16	0

  

Year 2		Spring		Hours	
Fall	Hours		Hours		
ARTG 5110		4 ARTG 7100		4	
ARTG 6700		4 ARTG 7910		4	
Elective		4 ARTG 7990		4	
Elective		4			
		16		12	

Total Hours: 60

**Sample Three Years, Co-op in Fall**

Year 1		Spring		Hours	
Fall	Hours		Hours		
ARTG 5100		4 ARTG 5310		4	
ARTG 5130		4 ARTG 5330		4	
ARTG 5150		3 ARTG 6100		4	
ARTG 5151		1 ARTG 6110		4	
ARTG 5320		4			
		16		16	

  

Year 2		Spring		Hours	
Fall	Hours		Hours		
Co-op		0 ARTG 7100		4	
ARTG 6700		4 ARTG 7910		4	
Elective		4		4	
		4			
				12	

  

Year 3		Hours		Hours	
Fall	Hours		Hours		
ARTG 5110		4			
ARTG 7990		4			
Elective		4			
		12			

Total Hours: 60

**Sample Three Years, Co-op in Spring**

Year 1		Spring		Hours	
Fall	Hours		Hours		
ARTG 5100		4 ARTG 5310		4	
ARTG 5130		4 ARTG 5330		4	
ARTG 5150		3 ARTG 6100		4	
ARTG 5151		1 ARTG 6110		4	
ARTG 5320		4			
		16		16	

<b>Year 2</b>			
Fall	Hours	Spring	Hours
ARTG 5110		4 Co-op	0
ARTG 6700		4	
		8	0

<b>Year 3</b>			
Fall	Hours	Spring	Hours
Elective		4 ARTG 7100	4
Elective		4 ARTG 7910	4
		ARTG 7990	4
		8	12

**Total Hours: 60**

### **Sample Three Years, Two Co-ops**

(Research co-op track)

<b>Year 1</b>			
Fall	Hours	Spring	Hours
ARTG 5100		4 ARTG 5310	4
ARTG 5130		4 ARTG 5330	4
ARTG 5150		3 ARTG 6100	4
ARTG 5151		1 ARTG 6110	4
ARTG 5320		4	
		16	16

<b>Year 2</b>			
Fall	Hours	Spring	Hours
ARTG 6700		4 Co-op <sup>1</sup>	0
Co-op		0	
		4	0

<b>Year 3</b>			
Fall	Hours	Spring	Hours
ARTG 5110		4 ARTG 7100	4
Elective		4 ARTG 7910	4
Elective		4 ARTG 7990	4
		12	12

**Total Hours: 60**

<sup>1</sup> The second co-op must be a research-oriented co-op related to the thesis after completion of Design Studio 3: Synthesis (ARTG 6700) with the permission of the program coordinator.

### **Experience Design, MS**

The Master of Science in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The experience design program moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a real context in relation to emerging technologies, the Master of Science in Experience Design allows graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students study how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Master of Science in Experience Design seeks to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates should be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

The MS degree is intended for graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 220) program, students in the MS program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ARTG 5120	Research Methods for Design	4
ARTG 5600	Experience Design Studio 1: Principles	4
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 6310	Design for Behavior and Experience	4
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	4

### Electives

Code	Title	Hours
ARTG 5000	Topics in Design	8
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5640	Prototyping for Experience Design	
ARTG 5710	Design for Dignity	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

Year 1				
Fall	Hours	Spring	Hours	
ARTG 5120		4 ARTG 5610		4
ARTG 5600		4 ARTG 6310		4
ARTG 5620		4 ARTG 6600		4
Elective		4 Elective		4
		16		16

Total Hours: 32

\*Students may opt to do a graduate co-op. Co-op does not count toward credits required for the degree.

## Game Science and Design, MS

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Core</b>		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130 and GSND 5131	Mixed Research Methods for Games and Recitation for GSND 5130	4
<b>Thesis</b>		
Students select Thesis or Capstone course in consultation with the program coordinator.		
GSND 6330 and GSND 6331	Player Experience and Recitation for GSND 6330	4

GSND 7990 or GSND 7980	Thesis Capstone	4
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**Electives**

Code	Title	Hours
<b>Game Design or Development</b>		
Complete one of the following:		4
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	
<b>Game User Research or Analytics</b>		
Complete one of the following:		4
CS 5340	Computer/Human Interaction	
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
Code	Title	Hours
<b>Other Electives List</b>		
Complete any two of the previously listed courses or from the following (courses not listed below may be completed in consultation with your program coordinator).		8
If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.		
Elective courses outside of CAMD are subject to availability and registration policy of the home college.		
ARTG 5000	Topics in Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

**Program Credit/GPA Requirements**

34 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Sample Plan of Study****TWO YEARS, ONE (OPTIONAL) CO-OP**

Year 1	Fall	Hours	Spring	Hours	Summer Full Semester	Hours
	GSND 5110 and GSND 5111 and GSND 5112		5 Elective		4 Co-op (optional)	0

GSND 5130 and GSND 5131	4 Elective	4	
	9	8	0
<b>Year 2</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
GSND 5122		1 GSND 7990 or 7980	4
GSND 6330 and GSND 6331		4 Elective	4
Elective		4	
	9	8	

Total Hours: 34

## Information Design and Data Visualization, MS

The Master of Science in Information Design and Data Visualization is a two-semester research- and analysis-oriented program focusing on visual interfaces to communicate and explore digital information. Successful graduates may become professional information designers and data visualization experts able to collaborate effectively in this dynamic and burgeoning field of practice and research, prepared to work in data-driven areas including design, technology, business, health, education, and public institutions. The curriculum is designed to train students in design principles, critical inquiry, and the analytical and creative practices needed to assume leadership roles in an evolving interdisciplinary field. Coursework focuses on the translation of data and information into visual languages and the integration of theoretical, cognitive, and technical aspects of visualizations that engage a broad range of audiences. From this master's program, students have multiple options to expand their advanced studies along diverse avenues, including adding graduate certificates in related topics such as user analytics, data analytics, experience design, and cultural entrepreneurship; engaging in co-op opportunities; and applying to proceed academically into a terminal Master of Fine Arts degree.

To learn more visit the Information Design and Data Visualization (<https://camd.northeastern.edu/program/information-design-and-visualization/>) page.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Boston-based students complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
ARTG 5100	Information Design Studio 1: Principles	4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5310	Visual Cognition	4
ARTG 5320	Statistics for Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	4
ARTG 6110	Information Design Theory and Critical Thinking	4

## Elective

Thesis (ARTG 7890) is required in lieu of an elective for Vancouver-based students in consultation with program coordinator.

Code	Title	Hours
Complete one of the following:		
ARTG 5000	Topics in Design	4
ARTG 5110	Information Design History	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	

ARTG 5430	Visualization Technologies 2: Advanced Practices
ARTG 5710	Design for Dignity
ARTG 6310	Design for Behavior and Experience
ARTG 6330	Information Design Mapping Strategies
ARTG 6555	Graphic Design Synthesis
ARTG 7890	Thesis

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Sample Plans of Study

#### Two Semesters, No Co-op<sup>1</sup>

Year 1				
Fall	Hours	Spring	Hours	
ARTG 5100		4 ARTG 5310		4
ARTG 5150 and ARTG 5151		4 ARTG 5330		4
ARTG 5320		4 ARTG 6100		4
Elective		4 ARTG 6110		4
		16		16

**Total Hours: 32**

<sup>1</sup> Summer co-op is optional in consultation with the program coordinator.

#### Four Semesters, No Co-op<sup>2</sup>

Year 1				
Fall	Hours	Spring	Hours	
ARTG 5100		4 ARTG 5310		4
ARTG 5320		4 ARTG 5150 and ARTG 5151		4
		8		8

  

Year 2				
Fall	Hours	Spring	Hours	
ARTG 5330		4 ARTG 6110		4
ARTG 6100		4 Elective		4
		8		8

**Total Hours: 32**

<sup>2</sup> Students can choose to do a co-op in the summer between year 1 and year 2.

## Media Innovation and Data Communication, MS

The Master of Science will offer a distinctive approach to knowledge and innovation in media fields, an approach rooted in the rigor of professional journalism—with its emphasis on empowered knowledge acquisition, empirical verification, and storytelling in the public interest—but one keenly attuned to emerging, data-driven technologies and their potential. The program capitalizes on the revolution in data storytelling and computational methods in media work; the rapid evolution in video, animation, and augmented/virtual reality technologies; and social networks and digital analytics. Our graduates will be prepared to become leaders in media firms and outlets engaged with cutting-edge technologies and innovative digital startups, as well as a broad range of media and communications organizations across the rapidly evolving digital economy.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
ARTG 5330	Visualization Technologies 1: Fundamentals	4
JRNL 6306	Media Innovation Studio 1	4
JRNL 6307	Media Innovation Studio 2	4
JRNL 6340	Fundamentals of Digital Journalism	4
JRNL 6341	Telling Your Story with Data	4

## Electives

Code	Title	Hours
Students must complete 16 semester hours.		16

*Note: Courses in other disciplines may be taken in consultation with your faculty advisor. No more than two courses outside of CAMD may be taken.*

## Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Three Semesters and No Co-op

Year 1		Year 2	
Fall	Hours	Spring	Hours
JRNL 6340		4 JRNL 6306	4
JRNL 6341		4 ARTG 5330	4
Elective		4 Elective	4
		12	12

Year 2		Year 3	
Fall	Hours	Spring	Hours
JRNL 6307		4	
Elective		4	
Elective		4	
		12	12

Total Hours: 36

### Four Semesters and One Six-Month Co-op

Year 1		Year 2		Year 3		Year 4	
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 6340		4 JRNL 6306		4 Vacation		Co-op	0
JRNL 6341		4 ARTG 5330		4			
Elective		4 Elective		4			
		12		12		0	0

Year 2		Year 3		Year 4	
Fall	Hours	Spring	Hours	Summer 1	Hours
JRNL 6307		4 Elective		4	

Co-op	0 Elective	4
	4	8

Total Hours: 36

### Three Semesters and One Summer Co-op

Year 1		Year 2		Year 3	
Fall	Hours	Spring	Hours	Summer	Hours
JRNL 6340		4 JRNL 6306		4 Co-op	0
JRNL 6341		4 ARTG 5330		4	
Elective		4 Elective		4	
	12			12	0
Year 2		Year 3		Year 4	
Fall	Hours	Spring	Hours	Summer	Hours
JRNL 6307		4			
Elective		4			
Elective		4			
	12				

Total Hours: 36

### Experience Design, Graduate Certificate

The Graduate Certificate in Experience Design embraces research-driven design thinking for entrepreneurship, innovation, and other areas, preparing students to be vital contributors and leaders at the intersection of innovation and design.

Experience design is a holistic and integrative approach to design that utilizes investigation into the human experience in specific situations to improve its quality, given an understanding of human goals, needs, and desires. For example, in the context of healthcare, an experience designer does not focus on the design of any one technology product, information system, or physical space. Instead, the designer is charged with understanding and improving the overall sequence of events that impact the patient before and during a hospital stay as well as through follow-up care.

The Graduate Certificate in Experience Design moves beyond design thinking to produce outcomes that demonstrate the value of human-centered research and design methods. It draws on findings from a range of professional and scholarly disciplines (including business, psychology, human-computer interaction, engineering, cybernetics) to understand and shape specific situations. It extends across many industries and aspects of life: healthcare, technology, services, travel, education, entertainment, shopping, dining, and the nature of work itself.

Through examining how people behave in a *real* context in relation to emerging technologies, the Graduate Certificate in Experience Design allows working professionals or graduates from design and related disciplines (such as communications, computer science, business, architecture, art, journalism, humanities, and the social sciences) to gain knowledge and experience in the design competencies. To accomplish these goals, students need to learn how to invoke cooperation, collaboration, and integration across disciplines and practices.

The Graduate Certificate in Experience Design is designed to prepare students to be vital contributors and leaders of professional experience design teams where technological innovation intersects with design. Successful graduates will be able to analyze how people undergo real-world situations, enabling them to enrich experience by orchestrating new design-driven relationships. They will be equipped with the skills to identify shortcomings as well as opportunities for improved engagement between systems and elements—virtual or physical—with the humans who encounter them.

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in experience design to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Experience Design (p. 220) program, students in the certificate program will have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
ARTG 5610	Design Systems	4
ARTG 5620	Notational Systems for Experience	4
ARTG 6310	Design for Behavior and Experience	4

## Elective

Code	Title	Hours
ARTG	Complete 4 semester hours of 5000- to 6000-level course work in the following subject area:	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Game Experience Design, Graduate Certificate

The Graduate Certificate in Game Experience Design offers training in the skills, tools, and methods needed to design successful game products, including social and mobile gaming; augmented and virtual reality; as well as games for health, education, and science. Students gain hands-on experience in designing games under faculty with industry expertise in game design. Game design courses focus on innovation; societal impact; and player-centric, experiential design approaches. The Graduate Certificate in Game Experience Design is a one-year, 17-semester-hour program. Upon successful completion of the certificate, students can opt to apply to the Master of Science in Game Science and Design and, if accepted, may apply credits gained through the certificate to requirements of that degree program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5130	Mixed Research Methods for Games	4

## Electives

Code	Title	Hours
ARTG 5000	Topics in Design	
ARTG 5640	Prototyping for Experience Design	
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	

## Program Credit/GPA Requirements

17 total semester hours required

Minimum 3.000 GPA required

## Game Science, Graduate Certificate

The Graduate Certificate in Game Science offers training in assessing, tracking, and analyzing player experience using game analytics methods and techniques, biometrics, and research methods including interviews and surveys. Students gain hands-on experience with these methods and techniques under faculty guidance with industry experts in game science. The game development process has shifted from “design, develop, release” to “design, develop, release, and continuously fine-tune based on user data.” Game science plays a critical role in this new process. The Graduate Certificate in Game Science is a one-year, 17-semester-hour program. Upon successful completion of the certificate, students can opt to apply to the Master of Science in Game Science and Design and, if accepted, transfer credits gained through the certificate.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5130	Mixed Research Methods for Games	4

#### Electives

Code	Title	Hours
Complete two of the following (multiple completions of ARTG 5000 or GSND 6001 may apply toward the elective requirement):		
ARTG 5000	Topics in Design	8
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

#### Program Credit/GPA Requirements

17 total semester hours required

Minimum 3.000 GPA required

## Information Design and Visualization, Graduate Certificate

The Graduate Certificate in Information Design and Visualization focuses on the data-driven analytical and visual design of information, preparing students to communicate visually while engaging advanced data analytics to produce meaningful information environments.

Successful graduates of the Certificate in Information Design and Visualization are professionals who are prepared to tackle new information communication challenges and communicate and collaborate with researchers in a variety of fields, as well as stakeholders and the public. Throughout the course of the certificate, students master how to think visually, while also learning how to produce effective, meaningful visual information from various sources of data.

The certificate is intended for practitioners and graduate students from related fields—media, design, communications, data science, and more—who would like to acquire competencies in information design and data visualization to complement their skills and address their professional needs. Embedded in the course offering of our Master of Fine Arts in Information Design and Visualization (p. 221) program, students in the certificate program have the opportunity to join MFA students for activities such as attending guest lectures and workshops.

To learn more, visit the Information Design and Visualization (<https://camd.northeastern.edu/visualization/>) portal.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ARTG 5130	Visual Communication for Information Design	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4

### Electives

Code	Title	Hours
Complete two of the following (multiple completions of ARTG 5000 may apply toward the elective requirement):		
ARTG 5000	Topics in Design	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5110	Information Design History	
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5430	Visualization Technologies 2: Advanced Practices	
ARTG 5710	Design for Dignity	
ARTG 6100	Information Design Studio 2: Dynamic Mapping and Models	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
ARTG 6555	Graphic Design Synthesis	
ARTG 5000 or 6000 level course		

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### School of Journalism

Website (<https://camd.northeastern.edu/journalism/>)

**Jonathan Kaufman, MA**

Professor and Director

617.373.3236

Welcome to the graduate programs at Northeastern University's School of Journalism. Our school offers three degrees: a Master of Arts in Journalism, a Master of Science in Media Innovation and Data Communication, and a Master of Science in Media Advocacy.

The Master of Arts in Journalism degree is designed to merge traditional journalism with the latest technology. Students new to the field or those with experience can choose one of two tracks—professional journalism or media innovation—to prepare them for the challenges faced by legacy and new media in the digital age. The Master of Science in Media Innovation and Data Communication degree focuses on new forms of data-driven media practice, creative digital storytelling, and strategies for fostering innovation in media fields. The Master of Science in Media Advocacy degree is designed to teach strategic advocacy skills and prepare graduates to succeed as resilient, media-empowered citizens in a global society. Moreover, these programs offer students hands-on training in preparation for careers in reporting, editing, multimedia design and production, social media, and data journalism.

As part of Northeastern's College of Arts, Media and Design, our graduate students are also part of an interdisciplinary and creative community. Our core curriculum is supplemented by electives that take advantage of course offerings from within our college and from other colleges in the university. And with our experiential education opportunities and outstanding co-op program, students do not have to wait until after graduation to begin developing skills as reporters, media advocates, or public relations professionals.

It is our goal to help you put your passion into practice. To that end, our graduate programs afford students the opportunity to study in Boston with a small and dedicated faculty of specialists with years of experience and extensive contacts in the media world.

## Programs

### Master of Arts (MA)

- Journalism (p. 235)

### Master of Science (MS)

- Media Advocacy (p. 236)
- Media Innovation and Data Communication (p. 229)

## Journalism, MA

The School of Journalism offers a dynamic Master of Arts degree that seeks to prepare students for the challenges faced by media organizations in the digital age. The degree trains students to become rigorous, ethical, and creative news reporters, editors, and content producers, as well as social media managers and video/audio specialists.

Both students new to the field and those with some experience can choose courses tailored to help them thrive in particular subject areas, such as criminal justice or climate change, or around specific technologies, such as podcasting or data visualization. Our programs are designed to merge the skills of professional journalism with knowledge of the latest information technologies.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
JRNL 6200	Enterprise Reporting 1	4
JRNL 6201	Enterprise Reporting 2	4
JRNL 6202	Perspectives on News Media Ethics and Diversity	4
JRNL 6340	Fundamentals of Digital Journalism	4

## Electives

Code	Title	Hours
Complete 20 semester hours in the following range:		20
JRNL 5309 to JRNL 7976		
Courses from other disciplines may be taken in consultation with your faculty advisor.		
No more than two courses outside of CAMD may be taken.		

## Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Sample Plan of Study: Two Years with Co-op in Summer 2

Year 1	Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
	JRNL 6100	1	JRNL 6201	4	Vacation		0 Co-op	0
	JRNL 6200	4	JRNL 6202	4				
	JRNL 6340	4	Elective 2	4				

<b>Elective 1</b>	4				
	13	12		0	0
<b>Year 2</b>					
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>		
Co-op	0	Elective 3	4		
		Elective 4	4		
		Elective 5	4		
	0		12		

Total Hours: 37

## Media Advocacy, MS

The Master of Science in Media Advocacy places particular focus on developing direct and indirect advocacy skills: that is, to influence government decision makers directly and to change minds indirectly through shifting public opinion. The program uniquely combines grounding in governmental structures and the legal system with sophisticated training in the latest communication techniques including social media, web communications, and videography, as well as data analytics and data-driven storytelling. Successful graduates will be empowered to promote the public agenda of employers ranging from mission-driven organizations, such as the ACLU or the Sierra Club, to industry leaders, such as hospitals and technology companies, to lobbying and strategic communications groups and political consulting firms.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Core Requirements

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480	Research for Media Strategy	4
LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

### Electives

Code	Title	Hours
	A minimum of 17 credits of electives is required. No more than 8 semester hours can be taken outside of the College of Arts, Media, and Design or the School of Law.	17

Complete a minimum of 4 semester hours of coursework from the College of Arts, Media, and Design. Choose from recommended focus areas of JRNL, ARTD, ARTG, COMM, and INAM (additional areas may be chosen in consultation with your adviser).

Complete a minimum of 5 semester hours of coursework from the School of Law.

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Plan of Study

#### Sample One-and-a-Half Years with No Co-op

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400	4	JRNL 5480		Vacation		Vacation	0
LW 6400	4	Elective 2		3-4			
Elective 1		3-4	Elective 3		3-4		
	11-12		10-12			0	0

<b>Year 2</b>	
<b>Fall</b>	<b>Hours</b>
LW 7667	3
Elective 4	3-4
Elective 5	3-4
Elective 6	3-4
	<b>12-15</b>

**Total Hours: 33-39**

## Media Innovation and Data Communication, MS

The Master of Science will offer a distinctive approach to knowledge and innovation in media fields, an approach rooted in the rigor of professional journalism—with its emphasis on empowered knowledge acquisition, empirical verification, and storytelling in the public interest—but one keenly attuned to emerging, data-driven technologies and their potential. The program capitalizes on the revolution in data storytelling and computational methods in media work; the rapid evolution in video, animation, and augmented/virtual reality technologies; and social networks and digital analytics. Our graduates will be prepared to become leaders in media firms and outlets engaged with cutting-edge technologies and innovative digital startups, as well as a broad range of media and communications organizations across the rapidly evolving digital economy.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

<b>Code</b>	<b>Title</b>	<b>Hours</b>
ARTG 5330	Visualization Technologies 1: Fundamentals	4
JRNL 6306	Media Innovation Studio 1	4
JRNL 6307	Media Innovation Studio 2	4
JRNL 6340	Fundamentals of Digital Journalism	4
JRNL 6341	Telling Your Story with Data	4

## Electives

<b>Code</b>	<b>Title</b>	<b>Hours</b>
Students must complete 16 semester hours.		16

*Note: Courses in other disciplines may be taken in consultation with your faculty advisor. No more than two courses outside of CAMD may be taken.*

## Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Three Semesters and No Co-op

<b>Year 1</b>		<b>Spring</b>	<b>Hours</b>
<b>Fall</b>	<b>Hours</b>		
JRNL 6306	4	JRNL 6306	4
JRNL 6341	4	ARTG 5330	4
Elective	4	Elective	4
	12		12

<b>Year 2</b>	
<b>Fall</b>	<b>Hours</b>
JRNL 6307	4
Elective	4
Elective	4
	<b>12</b>

Total Hours: 36

### Four Semesters and One Six-Month Co-op

<b>Year 1</b>							
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer 1</b>	<b>Hours</b>	<b>Summer 2</b>	<b>Hours</b>
JRNL 6340	4	JRNL 6306	4	Vacation		Co-op	0
JRNL 6341	4	ARTG 5330	4				
Elective	4	Elective	4				
	<b>12</b>		<b>12</b>			<b>0</b>	<b>0</b>

<b>Year 2</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
JRNL 6307	4	Elective	4
Co-op	0	Elective	4
	<b>4</b>		<b>8</b>

Total Hours: 36

### Three Semesters and One Summer Co-op

<b>Year 1</b>					
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer Full Semester</b>	<b>Hours</b>
JRNL 6340	4	JRNL 6306	4	Co-op	0
JRNL 6341	4	ARTG 5330	4		
Elective	4	Elective	4		
	<b>12</b>		<b>12</b>		<b>0</b>

<b>Year 2</b>	
<b>Fall</b>	<b>Hours</b>
JRNL 6307	4
Elective	4
Elective	4
	<b>12</b>

Total Hours: 36

## Interdisciplinary Programs

Welcome to interdisciplinary graduate studies in the College of Arts, Media and Design. Here you'll find courses and programs that embrace shared dialogue and experiential learning across creative fields. These interdisciplinary doctoral programs, master's programs, and graduate certificates place collaboration at the core of their mission, integrating frameworks, methods, and practices to support students in developing truly innovative approaches and outcomes. Our interdisciplinary degree and certificate options provide a strong foundation of use-inspired, experientially informed coursework and research opportunities.

The PhD in Interdisciplinary Design and Media offers an innovative, globally aware, human-centered approach to advanced graduate study, focusing on practice-based research and scholarship applied to or conducted through making or creation.

The Master of Science in Arts Administration and Cultural Entrepreneurship and graduate certificate programs give students foundational to advanced training in the skills and techniques essential to leading arts and culture organizations today, combining the human literacies of collaboration and communication with the technical basis of arts organizational visioning, planning, and sustainable management.

The Master of Science in Urban Planning and Policy program is jointly offered between the college's School of Architecture and the School of Public Policy and Urban Affairs within the College of Social Sciences and Humanities. The curriculum provides a strong foundational knowledge base and allows specialization into the closely related areas of sustainable urban planning and contemporary approaches to urban policy for global cities.

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities (XR) to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality. The College of Arts, Media and Design partners closely with Bouvé College of Health Sciences, the College of Engineering, the D'Amore-McKim School of Business, and Khoury College of Computer Sciences to offer additional concentrations that provide breadth and depth of knowledge.

## Programs

### Doctor of Philosophy (PhD)

- Interdisciplinary Design and Media (p. 239)

### Master of Science (MS)

- Arts Administration and Cultural Entrepreneurship (p. 243)
- Extended Realities
- Urban Planning and Policy (p. 252)

### Graduate Certificate

- AI Applications (p. 255)
- Arts Administration (p. 256)
- Cultural Entrepreneurship (p. 257)

## Interdisciplinary Design and Media, PhD

The PhD provides a rigorous, globally aware, practice-based, and human-centered approach to advanced scholarship. It aims to cultivate researcher-designers with a versatile repertoire of methods and a passion for applying those skills to the emerging epistemic perspective of integrated human, technological, and data frameworks within creative collaboration across disciplinary boundaries. The degree is designed to attract entrepreneurial self-starters who seek to break ground and invent new fields through hybrid and integrated approaches to knowledge creation.

The PhD emphasizes four pillars of excellence within a research culture:

- Engaging with the nature of human experience through innovative, interdisciplinary approaches to design
- Investigating new forms of digital media and data-driven communication across diverse disciplines
- Articulating how creativity can embrace connections between artistic practices, innovation, entrepreneurship, and research
- Connecting with changing forms of technology and media to foster shared experiences and exchange within local and global communities

The PhD is unique in its focus on practice-based research or scholarship applied to or conducted through making or creation. This is an emerging area that has been applied internationally to a wide range of creative fields and industries, many of which are represented within the College of Arts, Media and Design: music, theatre, design, studio art, games, architecture, journalism, and others. It differs from other forms of knowledge creation in that it rigorously cultivates the creation of artifacts as a mode of producing new knowledge, theories, and methodologies. Practice-based research integrates fields such as creativity and cognition or human-computer interaction to understand how practice operates, to enact that knowledge in practical applications, and to use the acts of creation themselves as a research methodology. PhD students will be encouraged to conduct their research in—and in some cases create—"living labs" embedded in real-world contexts and through on- and off-campus research partnerships.

The PhD degree program is composed of a common core and pathways of specialization. The core is centered around three areas: design research, which provides a methodology for understanding the ways design and media touch every aspect of daily life at every level of society; ethical practice, which engages with the humanistic concerns of design and cultural production; and experiential learning, which offers students the opportunity to produce research and conduct fieldwork with partner organizations.

Specialized pathways, customized according to the program of study as approved by the PhD advisors and vetted by external experts, include:

- Information design and visualization
- Design research
- Creative research

## Degree Requirements

### POSTBACCALAUREATE ENTRY

The PhD degree requires completion of at least 48 semester credit hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need five years to complete the program.

### ADVANCED ENTRY

Students can petition for an advanced entry, which requires completion of at least 28 semester hours. Advanced entry requires an advanced degree (MS, MA, MFA, etc.) or extensive experience aligned with the research direction of the candidate. While students can qualify for advanced entry upon acceptance, the decision for students to continue in the advanced program is made after the first year, where they have to demonstrate that they do not need additional coursework and can complete the program in four years.

## Qualifying Examination

The qualifying exam is a written and/or oral examination in the primary and secondary research fields that ensures the student is intimately familiar with the relevant scholarly work in their area of concentration. The pedagogical role is not in the examination itself but in the rigorous preparation of the primary and secondary fields by the student, approved by the advisor. Prior to the qualifying exam, the student prepares a document that outlines the selected primary and secondary fields, provides an overview of the current state of research, and assembles a list of relevant literature that will serve as the basis for the examination. The emphasis of the examination (for example, short essays, a lecture presenting a scholarly argument) is to be useful for the dissertation research. Typically, the student takes the qualifying examination during the second year.

## Dissertation Proposal Defense

To ensure students complete satisfactory dissertations that are appropriate for their focus area(s), all students are required to submit and defend a dissertation proposal prior to advancing to candidacy. The dissertation proposal is a detailed document outlining the scholarly context, methods, arguments, and activities underpinning the dissertation. It will include a detailed research plan and timeline and is to be approved by the student's dissertation committee, which the student has to assemble in advance. The student then defends the accepted dissertation proposal in the context of the research seminar, inviting feedback from faculty and other students. The dissertation proposal defense is open to the entire CAMD PhD community and constitutes the last step before degree candidacy.

## Degree Candidacy

A student is considered a PhD degree candidate after:

- Successfully completing core and specialization courses with a minimum of a 3.000 cumulative GPA and no grades lower than a B in core courses
- Passing the qualifying exam
- Submitting and successfully defending the dissertation proposal

## Advising and Committee Formation

Each entering student will be assigned to a faculty advisor based on their interests who will guide students in completing their core requirements of their degree. Ideally, this person will also serve as their thesis committee chair, but they may transition to another committee chair as they transition into ABD status. As part of this process, in addition to their thesis committee chair, they will also be expected to identify two other readers representing their secondary and, if applicable, tertiary discipline areas. The advisory committee will be responsible for guiding the students through their individual research proposal process, helping them to develop a robust research methodology and clear plan for completion. The advisory committee will also be responsible for identifying an appropriate external expert to consult at key stages of degree progression. The advisors will also guide the students through the thesis project and its written component. Where applicable, committee members will also mentor and support the student through funded research.

## Dissertation Defense

Each student will, with the aid of their advisor and committee, define the final product. The research component will typically consist of empirical and/or theoretical scholarship created using a methodology appropriate for the topic and field that is fully integrated with the practice component. The synergy between creative practice and research can take the form of knowledge production through a variety of potential means: production of digital and physical artifacts, software and hardware applications, games, paintings, documentaries, comics, exhibitions, design projects or products, theatrical productions, musical compositions, performances, or other formats. The work will include a written dissertation that can also be paired with other modes of conveyance, such as a documentary, demonstration, performance, or exhibition. A key function of the dissertation will be to contextualize the practical work in contemporary scholarship and discourse, clearly articulating its rationale and contribution to the field. Over the course of their studies, students are expected to produce peer-reviewed submissions based on their work.

The dissertation defense follows a similar format to the proposal defense. Acceptable dissertation models may include long-form (book-style) dissertations, multiple publishable papers, a system build-evaluate model, or other creative formats enumerated above.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Milestones

Annual review

Individual path (including advisors)

Teaching requirement

Qualifying examination

Dissertation proposal

Dissertation committee

Dissertation defense

## Required Coursework

Code	Title	Hours
INAM 7000	Introduction to Research in Interdisciplinary Design and Media	4
INAM 7001	Research Methods in Interdisciplinary Design and Media	4
INAM 7900	Research Seminar	4
INAM 7901	Dissertation Writing Seminar	4
<b>Research Methods Elective</b>		
Complete one research methods elective from this list or in consultation with your advisor.		
ARCH 6340	Graduate Topics in Architecture	
ARTG 5110	Information Design History	
ARTG 5120	Research Methods for Design	
ARTG 5310	Visual Cognition	
ARTG 5320	Statistics for Design	
ARTG 5620	Notational Systems for Experience	
ARTG 6110	Information Design Theory and Critical Thinking	
GSND 5110	Game Design and Analysis	
GSND 5130	Mixed Research Methods for Games	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
GSND 6984	Research	
INAM 6300	Models for Applied Inquiry in Creative Practice	
JRNL 5400	Media and Advocacy in Theory and Practice	
<b>Dissertation</b>		
INAM 9990	Dissertation Term 1	
INAM 9991	Dissertation Term 2	

## Discipline-Specific Coursework

Code	Title	Hours
Complete 28 semester hours of discipline-specific coursework in consultation with your domain-specific advisor and committee members.		28

## Program Credit/GPA Requirements

A minimum of 48 semester hours of coursework beyond the undergraduate degree is required.  
A minimum 3.000 cumulative GPA and no grades lower than a B in core courses are required.

## Plan of Study

Year 1			
Fall	Hours	Spring	Hours
INAM 7000		4 INAM 7900	4
INAM 7001		4 Research methods elective	4
Discipline-specific coursework		4 Discipline-specific coursework	4
	12		12
Year 2			
Fall	Hours	Spring	Hours
Discipline-specific coursework		4 Discipline-specific coursework	4
Discipline-specific coursework		4 Discipline-specific coursework	4
Discipline-specific coursework		4 INAM 7901	4
	12		12
Year 3			
Fall	Hours	Spring	Hours
Qualifying exams		0 Teaching requirement, TA	0
Teaching requirement, TA		0 INAM 9991	

INAM 9990		0	0
<b>Year 4</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
Teaching requirement, teacher of record		0 Teaching requirement, teacher of record	0
INAM 9996		0 INAM 9996	0
		0	0
<b>Year 5</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
INAM 9996		0 INAM 9996	0
		0	0

Total Hours: 48

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Milestones

Annual review  
 Individual path (including advisors)  
 Teaching requirement  
 Qualifying examination  
 Dissertation proposal  
 Dissertation committee  
 Dissertation defense

## Required Coursework

Code	Title	Hours
INAM 7000	Introduction to Research in Interdisciplinary Design and Media	4
INAM 7001	Research Methods in Interdisciplinary Design and Media	4
INAM 7900	Research Seminar	4
INAM 7901	Dissertation Writing Seminar	4

### Research Methods Elective

Complete one research methods elective from this list or in consultation with your advisor.	4
ARCH 6340	Graduate Topics in Architecture
ARTG 5110	Information Design History
ARTG 5120	Research Methods for Design
ARTG 5310	Visual Cognition
ARTG 5320	Statistics for Design
ARTG 5620	Notational Systems for Experience
ARTG 6110	Information Design Theory and Critical Thinking
GSND 5110	Game Design and Analysis
GSND 5130	Mixed Research Methods for Games
GSND 6320	Psychology of Play
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
GSND 6984	Research
INAM 6300	Models for Applied Inquiry in Creative Practice
JRNL 5400	Media and Advocacy in Theory and Practice

### Dissertation

INAM 9990	Dissertation Term 1
INAM 9991	Dissertation Term 2

## Discipline-Specific Coursework

Code	Title	Hours
Complete 8 semester hours of discipline-specific coursework in consultation with your domain-specific advisor and committee members.		

## Program Credit/GPA Requirement

A minimum of 28 semester hours of coursework beyond the graduate degree is required.  
A minimum 3.000 cumulative GPA and no grades lower than a B in core courses are required.

## Advanced Entry Plan of Study

<b>Year 1</b>			
Fall	Hours	Spring	Hours
INAM 7000		4 INAM 7900	4
INAM 7001		4 Research methods elective	4
Discipline-specific coursework		4 Discipline-specific coursework	4
	12		12
<b>Year 2</b>			
Fall	Hours	Spring	Hours
Qualifying exams		0 Teaching requirement, TA	0
Teaching requirement, TA		0 INAM 7901	4
INAM 9990		0 INAM 9991	0
	0		4
<b>Year 3</b>			
Fall	Hours	Spring	Hours
Teaching requirement, teacher of record		0 Teaching requirement, teacher of record	0
INAM 9996		0 INAM 9996	0
	0		0
<b>Year 4</b>			
Fall	Hours	Spring	Hours
INAM 9996		0 INAM 9996	0
	0		0

**Total Hours: 28**

## Arts Administration and Cultural Entrepreneurship, MS

The arts and cultural industries are key drivers of each nation's economy, contributing more than \$730 billion annually in the United States alone. While the economic impact of the arts and cultural industries can be measured, their social impacts are often underestimated. Music, dance, visual art, and theatre are critical to how we perceive, interpret, and critique the world and people around us. The arts articulate our beliefs, politics, familial and community ties, and history.

Arts administrators are the bridge between creative practitioners and audiences and between arts institutions and supportive stakeholders. In today's digitally driven, highly competitive, and increasingly global economy, traditional institutions for visual and performing arts face critical sustainability challenges. Leaders in the arts must adopt the creative thinking and problem-solving skills of an entrepreneur in order to envision new models for creative practice, audience engagement, and funding.

The interdisciplinary Master of Science in Arts Administration and Cultural Entrepreneurship (AACE) prepares arts leaders to both convey the human necessity of creative expression and apply creative thinking to manage resources, inspire audience engagement, and sustain financial support. The arts, and audience opportunities to experience them, are more dynamic and diverse than ever before, flourishing in major arts institutions as well as nonhierarchical organizations, from artist-run spaces and community organizations to annual festivals and pop-up exhibitions. It is time for a transformation in leadership training that matches the ingenuity of today's most exciting experiments in music, dance, theatre, and the visual arts. Arts leaders must also be equipped with the administrative, analytical, and technological skill sets necessary to excel within the complex, interdependent arts ecosystem.

The AACE curriculum is designed to meet the changing needs of arts leaders, from administrators in arts institutions to creative practitioners and entrepreneurs eager to make their art startup a reality. The program focuses on leadership innovation in a range of performance, visual arts, and

cultural organizations. As an intellectual and practical course of study that merges the expertise of academics, creative professionals, administrators, and entrepreneurs, the program's aim is to support sustainable creative practice.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Arts Administration Foundation</b>		
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6020	Experiential Study in Arts Administration	3
<b>Cultural Entrepreneurship Foundation</b>		
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	3
AACE 6210	Building Value Through Cultural Enterprise	3
AACE 6300	Fundraising in the Arts	3

### Electives

Code	Title	Hours
<b>Arts Administration Directed Elective</b>		
Complete one of the following:		3
AACE 6110	Information Technology for Arts and Cultural Organizations	
AACE 6120	Advocacy and the Arts	
<b>Cultural Entrepreneurship Directed Elective</b>		
Complete one of the following:		3
AACE 6220	Innovative Approaches to Audience Engagement	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6250	Lean Design and Development	
<b>Experiential Electives in Arts Leadership</b>		
Complete two of the following courses not taken to fulfill the above requirements:		6
AACE 6110	Information Technology for Arts and Cultural Organizations	
AACE 6120	Advocacy and the Arts	
AACE 6220	Innovative Approaches to Audience Engagement	
ARTG 6310	Design for Behavior and Experience	
LW 6110	Law of Information and Records	
LW 6120	Law and Strategy	
LW 6160	Regulation and Global Business Strategies	

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

**Plan of Study****Sample Plans of Study****TWO YEARS**

Year 1					
Fall	Hours	Spring	Hours	Summer 1	Hours
AACE 6000		3 AACE 6010		3 Arts Administration Directed Elective	3
AACE 6200		3 AACE 6300		3	
		6		6	3

  

Year 2					
Fall	Hours	Spring	Hours	Summer 1	Hours
AACE 6020		3 Cultural Entrepreneurship Directed Elective		3 Experiential Elective 2	3
AACE 6210		3 Experiential Elective 1		3	
		6		6	3

Total Hours: 30

**ONE AND A HALF YEARS**

Year 1					
Fall	Hours	Spring	Hours	Summer 1	Hours
AACE 6000		3 AACE 6010		3 Arts Administration Directed Elective	3
AACE 6200		3 AACE 6020		3	
AACE 6210		3 AACE 6300		3	
		9		9	3

**Year 2**

Fall	Hours
Cultural entrepreneurship directed elective	3
Experiential elective 1	3
Experiential elective 2	3
	9

Total Hours: 30

**Creative Collaboration and Multidisciplinary Design, MS****Overview**

The Master of Science in Creative Collaboration and Multidisciplinary Design is an executive education degree rooted in the creative process as the main driver for adaptive thinking, dynamic communication, and empowering collaboration. In today's highly networked organizational structures, current and future leaders will need the skills to navigate the creative process, respond to shifting landscapes with agility, and articulate their vision through multiple modalities in ways that inspire, connect, and call others to action. This highly interactive, experiential degree will provide students with a combination of design skills and creativity techniques in a project-based learning environment to foster innovative leadership and empower communication. Graduates will leave with a flexible toolkit to nurture their individual creativity, adaptability in the face of rapid change, and skills to become well-rounded strategists and communicators.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Program Requirements

Code	Title	Hours
<b>Foundation</b>		
INAM 5300	Principles of Design	2
INAM 5305	User Observation and Design Planning	2
INAM 5310	Principles of Creative Collaboration	2
<b>Seminars</b>		
INAM 5507	Foundations of Data Visualization	1
INAM 5508	Visual Data Encodings	1
<b>Experiential</b>		
INAM 5400	Facilitating Creative Collaboration	2
INAM 5405	The Agile Mindset and Design-Led Innovation	2
INAM 5410	Persuasion and the Power of Storytelling	2
<b>Studio</b>		
INAM 5415	Design Studio: Fundamentals of Iterative Prototyping	2
<b>Capstone</b>		
INAM 6900	Interdisciplinary Capstone	4

## Electives

Code	Title	Hours
Complete 12 semester hours of electives from one of the ranges below (or in consultation with your graduate advisor):		
INAM 5300 to INAM 5349		12
INAM 5400 to INAM 5449		
INAM 5500 to INAM 5549		
INAM 6500 to INAM 6549		

## Plan of Study

### Sample Full-Time Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INAM 5300		2 INAM 5400		2 INAM 5415	2
INAM 5305		2 INAM 5405		2 INAM 5507	1
INAM 5310		2 INAM 5410		2 INAM 5508	1
Electives		6 Electives		6 INAM 6900	4
		12		12	8

Total Hours: 32

### Sample Part-Time Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INAM 5300		2 INAM 5400		2 INAM 5415	2
INAM 5305		2 INAM 5405		2 INAM 5507	2
INAM 5310		2 INAM 5410		2 INAM 5508	2
Elective		2 Elective		2 Elective	2
		8		8	8

  

Year 2					
Fall	Hours	Electives	Hours	INAM 6900	Hours
			4		
			4		
			8		

Total Hours: 32

## Extended Realities, MS

### Overview

The Master of Science in Extended Realities seeks to open the new technologies, methods, practices, and skills of extended realities (XR) to students. XR includes augmented, virtual, and mixed reality. XR technologies have seen explosive growth over the last decade of mixed reality.

This program is structured to allow students flexibility and specialization to choose a path that matches their interest. Students have the opportunity to focus on a single concentration area or a mix of course electives depending upon their professional background and aspirations. The College of Arts, Media and Design partners closely with Bouvé College of Health Sciences, the College of Engineering, the D'Amore McKim School of Business, and Khoury College of Computer Sciences to offer additional concentrations that provide breadth and depth of knowledge.

The Master of Science in Extended Realities welcomes students from a diverse range of backgrounds because of the applications of XR technology used in many disciplines and industries, including medicine, business, entertainment, architecture, and journalism.

Some concentrations may require a technical background and are noted in the requirements.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

#### Extended Reality Core

Code	Title	Hours
<b>Required Courses</b>		
EXRE 5010 and EXRE 5011	Immersive Media: Extended Realities (XR) History, Theory, and Impact and Seminar for EXRE 5010	5
EXRE 5020	Developing Extended Realities (XR)	4
EXRE 5030	Designing Extended Realities (XR)	4
EXRE 6500	Extended Realities (XR) Studio	4
EXRE 7500 or EXRE 7990	Extended Realities (XR) Project Thesis	4
GSND 5122	Business Models in the Game Industry	1

#### Extended Reality Concentration Options

Complete one of the following options:

- Artificial Intelligence (p. 248)
- Data Visualization (p. 248)
- Entrepreneurship (p. 248)
- Experience Design (p. 248)
- Game Design (p. 249)
- Game Science (p. 249)
- Human Computer Interaction (p. 249)
- Human Movement Science (p. 249)
- Information Ethics (p. 249)
- Marketing (p. 250)
- Media Innovation and Advocacy (p. 250)
- Public History (p. 250)
- Wireless Networking (p. 250)
- XR Design (p. 251)
- XR Development (p. 251)

## Program Credit/GPA Requirements

34 total semester hours required. Some concentrations may require more than 34 semester hours to complete.  
Minimum 3.000 GPA required

### ARTIFICIAL INTELLIGENCE CONCENTRATION

Code	Title	Hours
Requires a background in computer science.		
Complete three of the following:		
CS 5097	Mixed Reality	12
CS 5100	Foundations of Artificial Intelligence	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	

### DATA VISUALIZATION CONCENTRATION

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
ARTG 5330	Visualization Technologies 1: Fundamentals	4
<b>Electives</b>		
Complete 4 semester hours from the following:		
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

### ENTREPRENEURSHIP CONCENTRATION

Code	Title	Hours
<b>Required Courses</b>		
INNO 6200	Enterprise Growth and Innovation	3
<b>Electives</b>		
Complete 9 semester hours from the following:		
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

### EXPERIENCE DESIGN CONCENTRATION

Code	Title	Hours
<b>Required Courses</b>		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
<b>Electives</b>		
Complete 4 semester hours from the following:		
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

**GAME DESIGN CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
<b>Electives</b>		
Complete 8 semester hours from the following:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	

**GAME SCIENCE CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
<b>Electives</b>		
Complete at least 8 semester hours from the following:		8
GSND 6001	Advanced Topics in Game Science	
GSND 6330 and GSND 6331	Player Experience and Recitation for GSND 6330	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

**HUMAN COMPUTER INTERACTION CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
CS 5340	Computer/Human Interaction	4
<b>Electives</b>		
Complete 8 semester hours from the following:		8
ARTG 5710	Design for Dignity	
CS 5097	Mixed Reality	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 6350	Empirical Research Methods	
CS 7390	Special Topics in Human-Centered Computing	
GSND 6340	Biometrics for Design	

**HUMAN MOVEMENT SCIENCE CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
<b>Electives</b>		
Complete 7-8 semester hours from the following:		7-8
PT 5133	Kinesiology	
PT 5150	Motor Control, Development, and Learning	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 5410	Functional Human Neuroanatomy	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	
PT 7020	Technologies in Movement and Rehabilitation Science	

**INFORMATION ETHICS CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
Complete two of the following:		8

CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
<b>Elective</b>		
Complete one of the following:		4
PHIL 5001	Global Justice	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

**MARKETING CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
<b>Electives</b>		
Complete 9 semester hours from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

**MEDIA INNOVATION AND ADVOCACY CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
<b>Elective</b>		
Complete one of the following:		4-5
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics (and optional ARTG 5151)	
JRNL 6341	Telling Your Story with Data	

**PUBLIC HISTORY CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
HIST 5237	Issues and Methods in Public History	4
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1 (to be taken twice)	
<b>Elective</b>		
Complete one of the following:		4
HIST 5241	Exhibits and Museums	
HIST 7219	Topics in Cultural History	
HIST 7250	Topics in Public History	

**WIRELESS NETWORKING CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
EECE 7374	Fundamentals of Computer Networks	4

**Electives**

Complete 8 semester hours from the following:

EECE 5155	Wireless Sensor Networks and the Internet of Things	8
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	

**XR DESIGN CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
GSND 6520	3D Modeling and Asset Creation Principles	4
<b>Electives</b>		
Complete at least 8 semester hours from the following:		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	8-9
ARTG 5310	Visual Cognition	
ARTG 5610	Design Systems	
ARTG 6310	Design for Behavior and Experience	
EXRE 5973	Topics in Extended Realities (XR)	
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	
GSND 6250	Spatial and Temporal Design	
GSND 6330	Player Experience	
GSND 6340	Biometrics for Design	
GSND 6460	Generative Game Design	
JRNL 6340	Fundamentals of Digital Journalism	

**XR DEVELOPMENT CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
CS 5097	Mixed Reality	4
<b>Electives</b>		
Complete 8 semester hours from the following:		
CS 5150	Game Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5310	Computer Graphics	
CS 5335	Robotic Science and Systems	
CS 5340	Computer/Human Interaction	
CS 5850	Building Game Engines	
CS 6140	Machine Learning	

**Plan of Study****Sample Plan of Study**

<b>Year 1</b>			
Fall	Hours	Spring	Hours
EXRE 5010 and EXRE 5011		5 EXRE 5030	4
EXRE 5020		4 GSND 5110 and GSND 5111 and GSND 5112	5
		9	9
<b>Year 2</b>			
Fall	Hours	Spring	Hours
EXRE 6500		4 EXRE 7500	4
GSND 5122		1 GSND 6350	4

Total Hours: 35

## Urban Planning and Policy, MS

The Master of Science in Urban Planning and Policy program trains leaders interested in building just and sustainable solutions to today's critical urban problems. Students in the program develop the theoretical and analytical tools to understand contemporary challenges of social, racial, and environmental injustice in cities and urban regions. They develop professional tools to work effectively in the realms of planning, policy, politics, and advocacy to impact urban challenges, including affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including techniques of effective community engagement, research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

The optional cooperative education experience (co-op) is available to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

In addition to the co-op option, students in the program have opportunities to gain experience in the application of their knowledge and skills via internships, class projects, and a capstone research report. They graduate prepared for careers working for state and local government, federal agencies, community development corporations and other nonprofit organizations, research institutes, and as private-sector planning consultants.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Planning and Policy</b>		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
<b>Research Design</b>		
INSH 6300	Research Methods in the Social Sciences	4
<b>Quantitative Techniques</b>		
Students in the urban analytics focus area are encouraged to take INSH 5301.		
Choose one from the following:		
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	
<b>Planning Law</b>		
Choose one from the following:		
LPSC 5201	Law and the City	
PPUA 5201	Urban Planning and the Law	
<b>Planning and Social Justice</b>		
Choose one from the following:		
PPUA 5233	Contemporary Community Development	2-4

PPUA 5235	Participatory Community Planning Methods
PPUA 6219	Race, Justice, and Belonging in Planning Practice

## Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 253)
- Urban Analytics (p. 253)
- Sustainability and Resilience (p. 253)
- Urban Development Policy and Planning (p. 254)

## URBAN DESIGN AND PHYSICAL PLANNING

Code	Title	Hours
<b>Gateway Course</b>		
ARCH 6340	Graduate Topics in Architecture	4
<b>Tracks</b>		
Complete one of the following tracks:		
<i>Urban Design and Real Estate</i>		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
<i>Physical Planning and Design for Sustainable Urbanism</i>		
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
<i>Urban Experience Track</i>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 6310	Design for Behavior and Experience	
<b>Capstone</b>		
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6

## URBAN ANALYTICS

Code	Title	Hours
<b>Gateway Course</b>		
PPUA 5262	Big Data for Cities	4
<b>Required Courses</b>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

## SUSTAINABILITY AND RESILIENCE

Code	Title	Hours
<b>Gateway Course</b>		
LPSC 7312 or SUEN 6310	Cities, Sustainability, and Climate Change Cities, Nature, and Design in Contemporary History and Theory	4
<b>Methods</b>		
Complete one of the following:		
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Elective</b>		
Complete one of the following:		
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	

PPUA 5238	Climate Change and Global Urbanization
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6220	Implementation and Visualization for Urban Environments 2
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory
SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

**URBAN DEVELOPMENT POLICY AND PLANNING**

Code	Title	Hours
<b>Gateway Course</b>		
Complete one of the following:		
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5233	Contemporary Community Development	
PPUA 5265	Global Urbanization and Planning	
<b>Methods</b>		
PPUA 5263 or PPUA 5236	Geographic Information Systems for Urban and Regional Policy Introduction to Real Estate Development for Urban Policy Makers	4
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Elective</b>		
Complete one of the following:		
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5265	Global Urbanization and Planning	
PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6340	Topics in Urban Environmental Design	

**Electives**

Code	Title	Hours
Complete 4-8 semester hours of the following:		
4-8		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	

ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 6330	Information Design Mapping Strategies
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5302	Information Design and Visual Analytics
PPUA 5230	Housing Policy
PPUA 5231	Transportation Policy
PPUA 5232	Immigration and Urban America
PPUA 5233	Contemporary Community Development
PPUA 5234	Land Use and Urban Growth Policy
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers
PPUA 5238	Climate Change and Global Urbanization
PPUA 5239	Problems in Metropolitan Policymaking
PPUA 5244	Comparative Public Policy and Administration
PPUA 5245	Education Policy in the United States
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5265	Global Urbanization and Planning
PPUA 5270	Food Systems and Public Policy
PPUA 6202	Research Toolkit for Python for Policy
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6506	Techniques of Policy Analysis
PPUA 6551	Nonprofit Organizations and Social Change
PPUA 7237	Advanced Spatial Analysis of Urban Systems
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6210	Implementation and Visualization for Urban Environments 1
SUEN 6220	Implementation and Visualization for Urban Environments 2
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory
SUEN 6340	Topics in Urban Environmental Design
SUEN 7230	Urban Ecologies and Technologies 1
SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

### Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

### Program Credit/GPA Requirements

48 total semester hours required (50 with optional co-op)

Minimum 3.000 GPA required

### AI Applications, Graduate Certificate

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own

contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- D'Amore-McKim School of Business
- Mills College at Northeastern

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

### Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		
EDUT 6150	AI in Education	4
HLTH 5800	AI Across the Health Sciences	4
IE 5640	Data Mining for Engineering Applications	4
JRNL 6460	AI in Media Industries	4
MISM 6250	Strategic AI for Business	4

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Arts Administration, Graduate Certificate

Today's arts sector is more vital and dynamic than ever, flourishing in both arts institutions and "non-hierarchical organizations," from artist-run spaces to community organizations. This context, paired with changes in the funding climate over the past 30 years, has generated a need to transform leadership training in the arts. Creative thinkers must be equipped with administrative, analytical, entrepreneurial, and technological skill sets to work within the complex, interdependent arts and cultural ecosystem.

The **Graduate Certificate in Arts Administration** offers an interdisciplinary graduate program focused on leadership innovation in performance, visual arts, cultural, and community organizations.

The Graduate Certificate in Arts Administration challenges students to create diverse, viable, and sustainable arts and culture projects and organizations; to use entrepreneurial practices in order to create transformation; to develop and deploy new arts and culture sector-focused business and analytic skills; and to design innovative planning and engagement strategies. Course and project work embeds experiential opportunities to explore and demonstrate transformational arts management approaches.

The required curriculum includes three core and one directed elective for a total of 12 credit hours. All courses can be completed online.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
AACE 6000	Arts and Culture Organizational Leadership	3
AACE 6010	Planning for Arts and Cultural Organizations	3
AACE 6020	Experiential Study in Arts Administration	3

### Elective

Code	Title	Hours
Complete one of the following:		3
AACE 6110	Information Technology for Arts and Cultural Organizations	
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	
AACE 6210	Building Value Through Cultural Enterprise (Building Value through Cultural Enterprise)	

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

#### Cultural Entrepreneurship, Graduate Certificate

Cultural entrepreneurs combine their passion for creative and cultural products and programs with creative, out-of-the-box thinking to forge the resilience of the arts sectors and the wider communities they serve. Cultural entrepreneurs employ innovative approaches to audience engagement – like a roving theater company, pop-up museum, or a smartphone app for artistic collaboration – to deliver artistic value to wide and diverse audiences and make a positive social, environmental, and economic impact. Today's cultural entrepreneurs operate in diverse professional environments, from consulting for organizational transformation to launching a creative startup. By understanding community impacts and activating a range of cultural and creative experiences, cultural entrepreneurs play a crucial role in ensuring the vitality of artistic engagement, advancing community goals, and strengthening society.

The **Graduate Certificate in Cultural Entrepreneurship** empowers students with a critical, creative perspective on arts programming and management and a myriad of creative management tools that harness new technologies for artistic engagement.

The Graduate Certificate in Cultural Entrepreneurship offers an interdisciplinary program to create diverse and viable projects and organizations for artistic experience and positive social impact. The program prepares students to become innovators in a range of artistic and cultural disciplines, from music, visual art, theater, and dance to community-building and transformation. The curriculum offers students the opportunity to identify opportunities for evolution in the arts and cultural sectors and to develop critical, creative practices; leadership acumen; and skill sets in arts management, strategic planning, and performance analysis to conceive and implement creative, cultural programming for community engagement and positive impact.

The program learning objectives provide students with opportunities to:

- Develop an understanding of methods and tools used to conceptualize, scope, pilot, evaluate, iterate and launch cultural entrepreneurship projects;
- Align creative practice and arts enterprise strategies with opportunities, challenges and resources to achieve desired impact;
- Apply communication, engagement and evaluation techniques to develop and sustain diverse audiences and stakeholder relationships;
- Engage in critical analysis of the work of peers and industry leaders by analyzing and contextualizing the quality, viability and sustainability of culturally-driven entrepreneurship.

The required curriculum includes three core courses and one directed elective for a total of 12 semester hours. All courses can be completed online.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
AACE 6200	Programming and Community Engagement for Cultural Entrepreneurs	3
AACE 6210	Building Value Through Cultural Enterprise	3
AACE 6220	Innovative Approaches to Audience Engagement	3

### Elective

Code	Title	Hours
Complete one of the following:		
AACE 6000	Arts and Culture Organizational Leadership	
AACE 6010	Planning for Arts and Cultural Organizations	
AACE 6110	Information Technology for Arts and Cultural Organizations	
ENTR 6212	Business Planning for New Ventures	

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### D'Amore-McKim School of Business

Website ([https://damore-mckim.northeastern.edu/?utm\\_medium=website&utm\\_source=catalog](https://damore-mckim.northeastern.edu/?utm_medium=website&utm_source=catalog))

**David De Cremer, PhD**, Dunton Family Dean

**Kate E. Klepper, MBA**, Associate Dean of Graduate Programs

Northeastern University's D'Amore-McKim School of Business has built and sustained a legacy of excellence for 100 years. Our graduate programs prepare leaders with a curriculum focused on technology, data analytics, and uniquely human skills like critical thinking, creativity, and an entrepreneurial mindset.

D'Amore-McKim is part of a thriving global network, attracting some of the best and brightest faculty across the business world. Many are founders of tech startups and respected management leaders, and our students benefit daily from their research and expertise.

Experience-fueled learning is at the heart of everything we do. Our students do more than master skills in their chosen business field. They put the knowledge gained from a demanding curriculum to work as they apply what they've learned to authentic business challenges. This educational model sets us apart.

### Graduate School of Business Administration

617.373.5992

Most graduate degrees: [gradbusiness@northeastern.edu](mailto:gradbusiness@northeastern.edu)

Most graduate certificates: [gradcertificates@northeastern.edu](mailto:gradcertificates@northeastern.edu)

Online MBA and online graduate certificates: [onlinemba@northeastern.edu](mailto:onlinemba@northeastern.edu)

### Graduate School of Professional Accounting

617.373.3244

[gspa@northeastern.edu](mailto:gspa@northeastern.edu)

## Master of Science

Northeastern University's D'Amore-McKim School of Business develops leaders and thinkers who will guide the future of work in an ever-evolving digital landscape. D'Amore-McKim master's degree programs help students build specialized expertise and gain a competitive advantage.

Our innovative master's programs—taught with D'Amore-McKim's focus on the tech economy—prepare students to excel in a data-driven business world. Students learn from our respected business faculty, many of whom are consultants, founders of tech startups, and respected management leaders. Students study alongside diverse classmates who share their passions and interests.

Students enroll in D'Amore-McKim's master's degrees for full-time or part-time study.

### Programs

#### Master of Science (MS)

- Business Analytics (p. 259)
- Business Analytics—Online (p. 260)
- International Management (p. 261)
- Management (p. 262)
- Management with Major in Fintech Management (p. 272)

#### Master of Science in Accounting (MSA)

- Accounting (p. 273)

#### Master of Science in Finance (MSF)

- Finance (p. 275)
- Quantitative Finance (p. 276)

## Business Analytics, MS

Northeastern University D'Amore-McKim School of Business's Master of Science in Business Analytics ([https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=msba](https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msba)) prepares students to lead in a business world driven by Big Data.

### Make Data-Driven Business Decisions

Students build the skills to know what data to analyze and understand how to leverage that data for strategic decision making. Classwork provides exposure to data mining, statistical and quantitative analysis, multivariate testing, and predictive modeling. Students explore how to build sales, enhance marketing, or strengthen a company's infrastructure.

### Integrate Classroom and Professional Experiences

Through in-class case studies and a capstone project, professors share real company data so that students apply their knowledge to actual business challenges. They gain unique perspectives as they learn from renowned experts who have led through times of rapid change. Through an optional graduate co-op, students translate ideas into action as they complete a project for an organization.

### Complete the Degree in as Few as 12 Months

Students complete seven courses throughout the first two semesters and an optional career management class developed by the Graduate Career Center advisor. Students may complete their final three courses over the summer term or can extend their studies and complete their program in the fall term.

Students enroll in this 30-semester-hour master's degree program for full-time study.

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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## Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6205	Data Wrangling for Business	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3
MISM 6213	Business Information Design, Quality, and Strategy	3
MISM 6214	Business Analytics Capstone	3

## Elective Coursework

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
HRMG 6223	Global Talent Management	
INTB 6230	Global Field Study	
MISM 6201	Database Management for Business	
MISM 6206	Modeling for Business	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	
MKTG electives as advised		

## Optional Career Management Course

Code	Title	Hours
BUSN 6200	Career Management	

## Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

## Business Analytics, MS—Online

Northeastern University D'Amore-McKim School of Business's Online Master of Science in Business Analytics ([https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=msba](https://damore-mckim.northeastern.edu/programs/ms-business-analytics/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msba)) prepares working professionals to lead in a business world driven by Big Data.

### Make Data-Driven Business Decisions

Students build the skills to know what data to analyze and understand how to leverage that data for strategic decision making. Classwork provides exposure to data mining, statistical and quantitative analysis, multivariate testing, and predictive modeling. Students explore building sales, enhancing marketing, or strengthening a company's infrastructure.

### Integrate Classroom and Professional Experiences

Through in-class case studies and a capstone project, professors share real company data so that students apply their knowledge to actual business challenges. They gain unique perspectives as they learn from renowned experts who have led through times of rapid change.

### Learn From Anywhere, Anytime

Listen to lectures, access course materials, and submit assignments by deadlines in this 100 percent online program. All courses are seven weeks long, and you'll focus on one course at a time for an intensive learning experience.

Students enroll in this 30-semester-hour master's degree program for online study.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6205	Data Wrangling for Business	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3
MISM 6213	Business Information Design, Quality, and Strategy	3
MISM 6214	Business Analytics Capstone	3

## Elective Coursework

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
HRMG 6223	Global Talent Management	
MKTG 6232	Engaging Customers and Markets	
MKTG 6294	Customer-Centric Research Methods for Marketing	
MKTG 6295	Customer Performance Modeling	
STRT 6210	Workforce Metrics and Analytics	

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## International Management, MS

Northeastern University D'Amore-McKim School of Business's Master of Science in International Management program is designed to prepare students to bridge local and international operations quickly and confidently.

### Develop a Global Mindset

Students have an opportunity to develop critical thinking skills to handle the challenges organizations and businesses face when operating across borders and cultures. Core courses focus on cultural agility, leadership, and workforce management. Students explore topics ranging from international trade to globalization of the world economy.

### Integrate Classroom and Professional Experiences

Students obtain real-world experiences that help them to gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects.

Students can gain experience tackling real business issues faced by a company aligned with their career aspirations through the "Make Your Case" consulting program. Students build storytelling and case-writing skills while gaining inside exposure to their chosen industry.

Students may enroll in this 30-semester-hour master's degree program for full-time and part-time study.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6226	Becoming a Global Leader	3

In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met: 3

STRT 6210	Workforce Metrics and Analytics (or graduate-level INTB elective)	3
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In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met: 3

FINA 6204	International Financial Management	
INNO 6200	Enterprise Growth and Innovation	
INTB 5000 - 6999		
INTB 6230	Global Field Study	
MKTG 6212	International Marketing	
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
INTB 6260	Advanced Topics in Global Management and Strategy	
STRT 6200	Strategic Decision Making in a Changing Environment	

## Electives

Code	Title	Hours
In consultation with advisor, complete 15 graduate-level semester hours from the following for which prerequisites have been met:		15
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, and STRT		

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Management, MS

### Overview

Northeastern University D'Amore-McKim School of Business's MS in Management ([https://damore-mckim.northeastern.edu/programs/ms-x/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=msx](https://damore-mckim.northeastern.edu/programs/ms-x/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=msx)) program enables students to gain the business knowledge and specialized expertise needed to be responsible business leaders of the world capable of working, navigating, and creating in a digital environment.

Students enroll in this 30-semester-hour master's degree program for full-time, part-time, or hybrid study. There are four ways to earn this master's degree:

### MS in Management: Boston Campus

MS in Management on our Boston campus allows students to personalize all aspects of their degree, including core coursework, to match their specific professional goals. Four core classes each represent a key domain: managing organizations, data-driven management, strategy and growth, and finance and operations. Students without a background in these areas have an opportunity to build foundational skills, and those with previous experience expand their knowledge in higher-level courses.

Students may focus their learning by selecting a market-aligned concentration. They'll personalize their program by selecting electives from the entire portfolio of graduate-level courses taught by D'Amore-McKim's industry-leading faculty. Or they may choose to take one elective from a diverse list of eligible graduate courses offered by other Northeastern colleges.

### MS in Management with a Concentration in Digital Transformation in Healthcare or Healthcare Administration: Online Only

MS in Management for online study focuses on healthcare and leverages a unique partnership between Northeastern University and the Mayo Clinic College of Medicine and Science. Coursework provides a deep understanding of the technical skills, regulatory frameworks, and managerial competencies necessary to join the next generation of healthcare pioneers.

Students choose one of two concentrations: Digital Transformation in Healthcare or Healthcare Administration. Digital Transformation in Healthcare is designed for current healthcare executives who want to leverage emerging technologies better. Healthcare Administration offers business and healthcare knowledge tailored for those entering the industry.

### MS in Management with a Concentration in Strategic Technology Leadership: Hybrid Only

MS in Management with a Concentration in Strategic Technology Leadership prepares executives and senior leaders to harness digital technology and innovation. They develop expertise in solving challenges with cutting-edge technologies and deepen their knowledge of strategies for managing technology adoption.

Students develop a project business plan under the guidance of a seasoned executive mentor. Classes are hybrid, with live online interactive courses and three in-person residencies in Boston or London.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
<b>Managing Organizations</b>		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
HRMG 6200	Managing People and Organizations	
HRMG 6212	Creating an Innovative Organization	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
MGMT 6214	Negotiations	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
<b>Data-Driven Management</b>		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
MISM 6200	Introduction to Business Analytics	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6203	Business Analytics Methods	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6200	Creating and Sustaining Customer Markets	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	
<b>Strategy and Growth</b>		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
INNO 6200	Enterprise Growth and Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
INTB 6200	Managing the Global Enterprise	
MKTG 6216	Market Focused Strategy	
SCHM 6213	Global Supply Chain Strategy	
STRT 6200	Strategic Decision Making in a Changing Environment	
<b>Finance and Operations</b>		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
FINA 6309	Foundations of Accounting and Finance	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
SCHM 6201	Operations and Supply Chain Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	

## Concentration Options

Students may complete one of the following concentrations. Not all concentrations are available at all locations; please refer to your advisor or admissions coach for the course availability each semester at your location. Courses taken to fulfill concentrations may be used toward the elective section below.

- Accounting Analytics (p. 265)
- Analytics (p. 266)
- Brand Management (p. 266)
- Business Management for Healthcare (p. 266)
- Corporate Finance (p. 267)
- Corporate Innovation (p. 267)
- Digital Transformation in Healthcare (p. 267)
- Entrepreneurship (p. 268)
- Healthcare Administration (p. 268)
- International Business (p. 269)
- Investments (p. 269)
- Leading People and Organizations (p. 269)
- Marketing (p. 269)
- Marketing Analytics (p. 270)
- Operations and Supply Chain Management (p. 270)
- Public Health (p. 270)
- Strategic Technology Leadership (p. 270)
- Sustainability and Business (p. 271)

## Electives

Code	Title	Hours
In consultation with advisor, complete 18 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		18
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISN, MKTG, SCHM, STRT		
In consultation with advisor, students may also select an interdisciplinary elective, for which prerequisites have been met, offered in partnership with other Northeastern University colleges. Choose from the following:		
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	
BIOT 5120	Foundations in Biotechnology	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5400	Scientific Information Management for Biotechnology Managers	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 6214	Experimental Design and Biostatistics	
CAEP 6326	Behavioral Concepts and Principles	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
ECON 5140	Applied Econometrics	

GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5617	Lean Concepts and Applications
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 6600	Computation and Visualization for Analytics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

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### CONCENTRATION IN ACCOUNTING ANALYTICS

Code	Title	Hours
<b>Required</b>		
MISM 6200	Introduction to Business Analytics	3
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6205	Data Wrangling for Business	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
ACCT 6203	Business Entity Taxation	
ACCT 6205	Auditing in a Big Data Environment	
ACCT 6207	Contemporary and Emerging Issues in Financial Reporting	
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	
ACCT 6231	Corporations and Shareholders	
ACCT 6235	Partners and Partnerships	
MISM 6210	Information Visuals and Dashboards for Business	
EEBA 6401	Experiential Business Decision Making (repeated 3 times)	

**CONCENTRATION IN ANALYTICS**

Code	Title	Hours
<b>Required</b>		
MISM 6200	Introduction to Business Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6205 or MISM 6203	Data Wrangling for Business Business Analytics Methods	
MISM 6206	Modeling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

**CONCENTRATION IN BRAND MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6223	Brand and Advertising Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6287	Succeeding in the Platform Economy	

**CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE**

Code	Title	Hours
<b>Required</b>		
FINA 6220 or SCHM 6223	Healthcare Finance Managing Healthcare Supply Chain Operations	3
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
<b>Optional Electives</b>		

Note: Electives are not required; the following course(s) are suggested beyond the concentration:

ENTR 6214	Social Enterprise
FINA 6220	Healthcare Finance
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
MGMT 6214	Negotiations
MKTG 6218	Managing Customer Engagement in a Service World
MKTG 6226	Consumer Behavior
PHTH 5232	Evaluating Healthcare Quality

PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	
<b>CONCENTRATION IN CORPORATE FINANCE</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Required</b>		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6205	Financial Strategy	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
<b>CONCENTRATION IN CORPORATE INNOVATION</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Electives</b>		
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6280	The Human Side of Innovation	
INNO 6200	Enterprise Growth and Innovation	
INNO 6217	Lean Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6227	Digital Bias in Business	
MGMT 6280	Innovation for Next-Generation Products and Systems	
<b>CONCENTRATION IN DIGITAL TRANSFORMATION IN HEALTHCARE</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
To earn the Concentration in Digital Transformation in Healthcare, students must complete the following four core courses of the core curriculum of this program:		
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
MISM 6200	Introduction to Business Analytics	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	
<b>Required</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6404	Patient Engagement Informatics and Analytics	3
INNO 6200	Enterprise Growth and Innovation	3
MGSC 6281	Service Innovation and Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6220 or FINA 6309	Healthcare Finance Foundations of Accounting and Finance	
HINF 5105	The American Healthcare System	
HRMG 6220	Health Organization Management	

MISM 6210	Information Visuals and Dashboards for Business
MISM 6212	Data Mining and Machine Learning for Business

**CONCENTRATION IN ENTREPRENEURSHIP**

Code	Title	Hours
<b>Electives</b>		
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6340	The Technical Entrepreneur as Leader	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

**CONCENTRATION IN HEALTHCARE ADMINISTRATION**

Code	Title	Hours
To earn the Concentration in Healthcare Administration, students must complete the following four core courses of the core curriculum of this program:		
FINA 6309 or SCHM 6223	Foundations of Accounting and Finance Managing Healthcare Supply Chain Operations	
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
MISM 6200	Introduction to Business Analytics	
STRT 6220	Strategic Management for Healthcare Organizations	
<b>Required</b>		
HRMG 6200	Managing People and Organizations	3
HRMG 6223	Global Talent Management	3
INNO 6200	Enterprise Growth and Innovation	3
MGMT 6214	Negotiations	2-3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
FINA 6309	Foundations of Accounting and Finance (If not taken towards concentration core)	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5105	The American Healthcare System	
HINF 6404	Patient Engagement Informatics and Analytics	
HRMG 6220	Health Organization Management	
HRMG 6230	Leading a Diverse and Inclusive Organization	
MGSC 6281	Service Innovation and Management	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
SCHM 6223	Managing Healthcare Supply Chain Operations (If not taken towards concentration core)	
STRT 6210	Workforce Metrics and Analytics	

**CONCENTRATION IN INTERNATIONAL BUSINESS**

Code	Title	Hours
<b>Required</b>		
INTB 6200	Managing the Global Enterprise	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
INTB 6212	Cultural Aspects of International Business	
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6249	Digitization of International Business	
STRT 6224	Managing the Sustainable Global Enterprise	

**CONCENTRATION IN INVESTMENTS**

Code	Title	Hours
<b>Required</b>		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6203	Investment Analysis	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6339	Quantitative Portfolio Management	

**CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS**

Code	Title	Hours
<b>Required</b>		
HRMG 6200	Managing People and Organizations	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6220	Health Organization Management	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	
STRT 6224	Managing the Sustainable Global Enterprise	

**CONCENTRATION IN MARKETING**

Code	Title	Hours
<b>Required</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	

MKTG 6223	Brand and Advertising Management
MKTG 6224	B2B and Strategic Sales
MKTG 6226	Consumer Behavior
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6234	Marketing Analytics
MKTG 6287	Succeeding in the Platform Economy

**CONCENTRATION IN MARKETING ANALYTICS**

Code	Title	Hours
<b>Required</b>		
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6234	Marketing Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

**CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

**CONCENTRATION IN PUBLIC HEALTH**

Code	Title	Hours
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 6208	Urban Community Health Assessment	3

**CONCENTRATION IN STRATEGIC TECHNOLOGY LEADERSHIP**

Code	Title	Hours
To earn the Concentration in Strategic Technology Leadership, students must complete the following four core courses of the core curriculum of this program:		
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INTB 6226	Becoming a Global Leader	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
<b>Required</b>		
Complete the following course three times:		6
INNO 6250	Integrated and Applied Technology Leadership Project	
Complete the following:		
INNO 6240	Strategic Disruption Residency 1	1
INNO 6241	Strategic Disruption Residency 2	1

INNO 6242	Strategic Disruption Residency 3	1
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, MISM, SCHM, or STRT Students may also select preapproved interdisciplinary electives, for which prerequisites have been met, offered in partnership with other Northeastern University colleges.		

### CONCENTRATION IN SUSTAINABILITY AND BUSINESS

Code	Title	Hours
<b>Required</b>		
MECN 6200 Global Competition and Market Dominance		
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	
STRT 6224	Managing the Sustainable Global Enterprise	

### Plan of Study

Not all concentrations are available at all locations; please refer to your advisor or admissions coach for the course availability each semester at your location.

### Sample Plans of Study

#### MS IN MANAGEMENT, BOSTON CAMPUS, 12 MONTHS

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Core area course 1		3 Core area course 3		3 Core area course 4	3
Core area course 2		3 Concentration course 2 or elective		3 Concentration course 4 or elective	3
Concentration course 1 or elective		3 Concentration course 3 or elective		3 Elective	3
		Elective			3
	9			12	9

Total Hours: 30

#### MS IN MANAGEMENT, BOSTON CAMPUS, 16 MONTHS

Year 1				
Fall	Hours	Spring	Hours	
Core area course 1		3 Core area course 3		3
Core area course 2		3 Concentration course 2 or elective		3
Concentration course 1 or elective		3 Concentration course 3 or elective		3
		Elective		3
	9			12

#### Year 2

Fall	Hours
Core area course 4	3
Concentration course 4 or elective	3
Elective	3
	9

Total Hours: 30

**MS IN MANAGEMENT WITH CONCENTRATION IN DIGITAL TRANSFORMATION, ONLINE ONLY**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INNO 6200		3 MISM 6200		3 MGMT 6213	3
STRT 6220		3 HINF 6404		3 Elective	3
MGSC 6281		3 SCHM 6223		3	
Elective		3 HINF 5101		3	
	12		12		6

Total Hours: 30

**MS IN MANAGEMENT WITH CONCENTRATION IN HEALTHCARE ADMINISTRATION, ONLINE ONLY**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INNO 6200		3 MISM 6200		3 MGMT 6213	3
STRT 6220		3 HRMG 6222		3 Elective	3
HRMG 6200		3 MGMT 6214		3	
FINA 6309 (or elective)		3 SCHM 6214 (or elective)		3	
	12		12		6

Total Hours: 30

**MS IN MANAGEMENT WITH CONCENTRATION IN STRATEGIC TECHNOLOGY LEADERSHIP, ONLINE WITH ON-CAMPUS RESIDENCIES**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
INNO 6222		3 MKTG 6230		3 Elective	3
INTB 6226		3 MISM 6212		3 Elective	3
INNO 6250		2 INNO 6250		2	
INNO 6240		1 INNO 6241		1	
	9		9		6

## Year 2

Fall	Hours
Elective	3
INNO 6242	1
INNO 6250	2
	6

Total Hours: 30

<sup>1</sup> Students will take courses online but will be required to attend an on-campus residency in Boston and/or London.

**Management, MS with Major in Fintech Management**

Admissions to this program may open in 2024-2025.

The Master of Science in Management with Major in Fintech Management focuses on finance and leverages technology to help develop financial services. Four core classes each represent a key domain: managing organizations, data-driven management, strategy and growth, and finance and operations. Students without a background in these areas have an opportunity to build foundational skills, and those with previous experience expand their knowledge in higher-level courses.

**Prerequisite Course**

Applicants without a prior degree or prior background in finance are required to complete the following course with a grade of C– or better before admission to the program:

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3

## Program Requirements

### Core Requirements

Code	Title	Hours
<b>Managing Organizations</b>		
	In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met from the following:	3
HRMG 6212	Creating an Innovative Organization	
MGMT 6213	Managing Ethics in the Workplace and Marketplace	
<b>Data-Driven Management</b>		
	In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met from the following:	3
MISM 6202	Foundations of Data Analysis for Business	
<b>Strategy and Growth</b>		
	In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met from the following:	3
INNO 6200	Enterprise Growth and Innovation	
INNO 6225	Acquisitions, Alliances, and Growth	
<b>Finance and Operations</b>		
	In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met from the following:	3
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
SCHM 6201	Operations and Supply Chain Management	

### Fintech Management Major Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6237	Fintech, Financial Innovation, and Blockchain	3
FINA 6333	Data Analytics in Finance	3
FINA 6340	Financial Markets and Banking in the Postcrisis Era	3
FINA 6342	Financial Data and Fintech	3
MISM 6210	Information Visuals and Dashboards for Business	3

### Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Accounting, MSA

Northeastern University D'Amore-McKim School of Business's Master of Science in Accounting is designed to prepare students for a career in the rapidly evolving accounting industry.

### Build Deep Accounting Expertise

Students build on their undergraduate accounting major and have an opportunity to gain the knowledge, skills, and credit hours needed to pursue CPA licensure and launch their careers in just seven months. Classwork deepens their expertise through advanced accounting topics, management best practices, and data analytics skills. The Board of Public Accountancy in Massachusetts has approved the program curriculum.

### Select a Track

Students may specialize in either audit or tax, guiding them toward the career that best suits their goals. The audit track offers intense exposure to ethics, auditing research, and forensic accounting. The tax track explores the intricacies of the tax industry so that students may gain a comprehensive understanding of taxation at all levels, from local to international.

### Integrate Classroom and Professional Experiences

Students have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects. Students gain unique perspectives as they learn from industry-leading faculty with years of practice as both PhDs and CPAs at Big 4 and other public accounting firms.

Students enroll in this 30-semester-hour master's degree program for full-time study.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6203	Business Entity Taxation	3
ACCT 6204	Financial Reporting for Integrated Multinational Enterprises	3
ACCT 6229	Accounting for Foreign Currency Transactions	1
<b>Ethics</b>		
ACCT 6253	Ethics in the Accounting Profession	3
<b>Financial Reporting</b>		
ACCT 6207	Contemporary and Emerging Issues in Financial Reporting	3
ACCT 6216	Financial Reporting for Governments and Nonprofit Entities	2

### Tracks

Complete one of the following tracks:

#### AUDIT TRACK

Code	Title	Hours
ACCT 6205	Auditing in a Big Data Environment	3
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6254	Accounting Research and Communication	3

#### TAXATION TRACK

Code	Title	Hours
ACCT 6231	Corporations and Shareholders	3
ACCT 6235	Partners and Partnerships	3
ACCT 6254	Accounting Research and Communication	3

### Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		
ACCT 5255	Forensic Accounting	
ACCT 5256	Internal Auditing	
ACCT 6239	State and Local Taxation	
ACCT 6240	International Taxation: Inbound Transactions	
ACCT 6243	Advanced Flow-Through Entities	
ACCT 6248	Income Taxation of Trusts and Estates	
ACCT 6292	Tax Research, Practice, and Ethics	

### Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Finance, MSF

Northeastern University D'Amore-McKim School of Business' Master of Science in Finance ([https://damore-mckim.northeastern.edu/programs/ms-finance/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=ptmsf](https://damore-mckim.northeastern.edu/programs/ms-finance/?utm_medium=website&utm_source=catalog&utm_campaign=ptmsf)) helps students cultivate the high-level knowledge needed to drive financial strategy in today's tech economy.

### Develop Deep Finance Expertise

Core courses and elective offerings help students become financial experts with the skills to diversify financial portfolios, effectively minimize risks, maximize return on investments, and sustain growth. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

### Integrate Classroom and Professional Experiences

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects.

Students can apply to participate in a student-managed mutual fund, The 360 Huntington Fund, where they gain valuable experience performing equity research and portfolio management. By participating in the Fund, students may earn one semester hour per semester with the option to fulfill a 3 semester hours elective course requirement by participating for three terms.

Students enroll in this 30-semester-hour master's degree program for part-time study.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Core Requirements

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

### Electives

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		
FINA 6207	Financial Modeling	3
FINA 6211	Financial Risk Management	3
FINA 6212	Fixed-Income Securities and Risk	3
FINA 6214	Mergers and Acquisitions	3
FINA 6215	Business Turnarounds	3
FINA 6216	Valuation and Value Creation	3
FINA 6217	Real Estate Finance and Investment	3
FINA 6219	Portfolio Management	3
FINA 6220	Healthcare Finance	3
FINA 6260	Entrepreneurial Finance and Venture Capital	3
FINA 6292	Advanced Topics in Finance	3
FINA 6360	Fund Management for Analysts	3
FINA 6361	Fund Management for Managers	3

A maximum of one graduate-level business course may be taken from the following subject codes:

ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, SCHM, and STRT

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

### Quantitative Finance, MSF

Northeastern University D'Amore-McKim School of Business's Full-Time MS in Quantitative Finance is designed to prepare students to thrive in a rapidly changing finance industry transformed by technology and innovation.

### Cultivate Advanced Finance and Fintech Skills

This quantitative finance curriculum emphasizes the intersection of finance and data analytics. Coursework integrates economics, mathematics, and computer science with financial theory and application. Students interested in pursuing the Chartered Financial Analyst designation will find CFA preparations integrated into their coursework.

### Integrate Classroom and Professional Experiences

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. Through an optional graduate co-op, students translate ideas into action as they complete a project for an organization.

Students can apply to participate in a student-managed mutual fund, The 360 Huntington Fund ([https://damore-mckim.northeastern.edu/programs/360-huntington-fund/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=msqf](https://damore-mckim.northeastern.edu/programs/360-huntington-fund/?utm_medium=website&utm_source=catalog&utm_campaign=msqf)), where they can gain experience performing equity research and portfolio management. By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

### Complete the Degree in as Few as 12 Months

In the first two semesters, students complete six required courses, one elective, and an optional career development program developed by the Graduate Career Center advisors. They may complete the remaining three elective courses over the summer term or extend their studies and complete their electives in the fall term.

Students enroll in this 30-semester-hour master's degree program for full-time study.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6331	Corporate Finance	3
FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analytics	3

### Electives

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours from the following for which prerequisites have been met:		12
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	

FINA 6214	Mergers and Acquisitions
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
INTB 6230	Global Field Study
FINA 6260	Entrepreneurial Finance and Venture Capital
FINA 6292	Advanced Topics in Finance
FINA 6336	Fixed-Income Securities and Derivatives
FINA 6337	Computational Methods in Finance
FINA 6338	Alternative Investments
FINA 6339	Quantitative Portfolio Management
FINA 6340	Financial Markets and Banking in the Postcrisis Era
FINA 6342	Financial Data and Fintech
FINA 6360	Fund Management for Analysts
FINA 6361	Fund Management for Managers

### Optional Career Management Course

Code	Title	Hours
BUSN 6200	Career Management	0

### Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Master of Business Administration

Northeastern University's D'Amore-McKim School of Business prepares learners to be responsible business leaders of the world capable of working, navigating, and creating in a digital environment.

D'Amore-McKim MBA students are ready to lead with impact. They build in-demand skills leveraging actual company data through projects as they learn from a faculty of consultants, respected management leaders, and startup founders. This prepares our students to become innovative leaders.

Integrating classroom instruction with authentic, experience-powered learning is what we do best at D'Amore-McKim. It's an approach that expands students' knowledge base, develops their creative mindset, and prepares them to meet the shifting demands of today's business world. Students in our MBA programs dive headfirst into experiences that give them fresh perspectives and in-demand skills.

Students enroll in D'Amore-McKim MBA programs full time, part time, or for online study.

### Programs

- Business Administration, MBA—Full-Time (p. 277)
- Business Administration, MBA—Online (p. 287)
- Business Administration, MBA—Part-Time (p. 288)

## Business Administration, MBA—Full-Time

The Northeastern University D'Amore-McKim School of Business Full-Time MBA ([https://damore-mckim.northeastern.edu/programs/full-time-mba/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=ftmba](https://damore-mckim.northeastern.edu/programs/full-time-mba/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=ftmba)) program is designed to prepare students to lead with impact. Our Full-Time MBA program integrates business knowledge with a deep understanding of technology, preparing students to stay ahead of change and become the leaders that today's business world demands. Students will choose from a wide-ranging list of in-demand electives and concentrations—including our signature MBA x concentrations—allowing them to develop a unique nonbusiness skill set.

### Integrate Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Through a corporate residency, students translate ideas to action for 3, 6, or up to 12 months. Far removed from the typical internship, students work full-time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

## Select Two Concentrations

Students will specialize their degree by selecting two in-demand business concentrations. Or, they could choose to add expertise in another professional area by choosing an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

## Build an Interdisciplinary Skill Set

Students will select six interdisciplinary (nonbusiness) semester hours of their choice. They can mix and match the content that interests them from a diverse list of eligible graduate courses across Northeastern colleges.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Core Requirements

Code	Title	Hours
<b>Marketing</b>		
MKTG 6318	Customer Value and the Enterprise	2
<b>Strategic Decision Making</b>		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
<b>Management</b>		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
<b>Innovation and Social Impact</b>		
BUSN 6363	Social Impact of Business	2
INNO 6318	Innovation Driven Strategy	2
<b>Career Management</b>		
BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
<b>Corporate Residency</b>		
BUSN 6954	Co-op Work Experience - Half-Time	0
BUSN 6964	Co-op Work Experience	0
BUSN 6970	Professional Projects	0
Three-month, six-month, or up to two six-month corporate residency options		

## Concentration Options

Complete two of the following concentrations:

- Analytics (p. 280)
- Brand Management (p. 281)
- Business Management for Healthcare (p. 281)
- Corporate Finance (p. 281)
- Corporate Innovation (p. 282)
- Entrepreneurship (p. 282)
- International Business (p. 282)
- Investments (p. 283)
- Leading People and Organizations (p. 283)
- Marketing (p. 283)
- Marketing Analytics (p. 284)
- Operations and Supply Chain Management (p. 284)

- Sustainability and Business (p. 284)
- MBA x Artificial Intelligence (p. 284)
- MBA x Bioinformatics (p. 285)
- MBA x Biotechnology Industry (p. 285)
- MBA x Cybersecurity (p. 285)
- MBA x Data Science (p. 285)
- MBA x Data Visualization (p. 285)
- MBA x Experience Design (p. )
- MBA x Extended Realities (p. 285)
- MBA x Game Design (p. 286)
- MBA x Game Science (p. 286)
- MBA x Information Ethics (p. 286)
- MBA x Media Innovation and Advocacy (p. 286)
- MBA x Public Health (p. 286)
- MBA x Software Development (p. 287)

**ELECTIVE**

Code	Title	Hours
<b>Experiential Requirement</b>		
In consultation with advisor, complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
ENTR 5000	New Venture Development	
INTB 6230	Global Field Study	
INTB 6238	Global Project	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
MKTG 6606	Digital, Analytics, Technology, and Automation Advanced Research Practicum	
<b>Open Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, and STRT		
<b>Interdisciplinary Requirement</b>		
In consultation with advisor, complete 6 graduate-level semester hours, for which requirements have been met, offered in partnership with other Northeastern University colleges:		6
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	
BIOT 5120	Foundations in Biotechnology	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5400	Scientific Information Management for Biotechnology Managers	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 6214	Experimental Design and Biostatistics	
CAEP 6326	Behavioral Concepts and Principles	

CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
ECON 5140	Applied Econometrics
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5617	Lean Concepts and Applications
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 6600	Computation and Visualization for Analytics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

### Program Credit/GPA Requirements

55 total semester hours required

Minimum 3.000 GPA required

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### CONCENTRATION IN ANALYTICS

Code	Title	Hours
<b>Required</b>		
BUSN 6365	Business Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	
IE 6600	Computation and Visualization for Analytics	
INSH 5302	Information Design and Visual Analytics	
MISM 6201	Database Management for Business	
MISM 6205	Data Wrangling for Business	
MISM 6206	Modeling for Business	
MISM 6210	Information Visuals and Dashboards for Business	

MISM 6212	Data Mining and Machine Learning for Business
MISM 6213	Business Information Design, Quality, and Strategy
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6234	Marketing Analytics
SCHM 6215	Supply Chain Analytics
STRT 6210	Workforce Metrics and Analytics

**CONCENTRATION IN BRAND MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
MKTG 6223	Brand and Advertising Management	3
MKTG 6320	Advanced Marketing Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6287	Succeeding in the Platform Economy	

**CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE**

Code	Title	Hours
<b>Required</b>		
FINA 6220 or SCHM 6223	Healthcare Finance Managing Healthcare Supply Chain Operations	3
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
<b>Optional Electives</b>		
Note: Electives are not required; the following course(s) are suggested beyond the concentration:		3–9
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

**CONCENTRATION IN CORPORATE FINANCE**

Code	Title	Hours
<b>Required</b>		
FINA 6320	Advanced Financial Management	3
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met:		3
FINA 6203	Investment Analysis	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
FINA 6203	Investment Analysis	

FINA 6204	International Financial Management
FINA 6205	Financial Strategy
FINA 6207	Financial Modeling
FINA 6211	Financial Risk Management
FINA 6213	Investment Banking
FINA 6214	Mergers and Acquisitions
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
FINA 6260	Entrepreneurial Finance and Venture Capital
FINA 6342	Financial Data and Fintech
MECN 6200	Global Competition and Market Dominance

**CONCENTRATION IN CORPORATE INNOVATION**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6280	The Human Side of Innovation	
INNO 6217	Lean Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6227	Digital Bias in Business	
INNO 6230	Platform Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	
MGSC 6281	Service Innovation and Management	

**CONCENTRATION IN ENTREPRENEURSHIP**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

**CONCENTRATION IN INTERNATIONAL BUSINESS**

Code	Title	Hours
<b>Required</b>		
INTB 6200	Managing the Global Enterprise	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		
FINA 6204	International Financial Management	9

INTB 6212	Cultural Aspects of International Business
INTB 6224	Competing to Win in Emerging Markets
INTB 6226	Becoming a Global Leader
INTB 6230	Global Field Study
INTB 6238	Global Project
INTB 6260	Advanced Topics in Global Management and Strategy
MKTG 6212	International Marketing
STRT 6224	Managing the Sustainable Global Enterprise

**CONCENTRATION IN INVESTMENTS**

Code	Title	Hours
<b>Required</b>		
FINA 6203	Investment Analysis	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6339	Quantitative Portfolio Management	
FINA 6342	Financial Data and Fintech	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
MECN 6200	Global Competition and Market Dominance	

**CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		12
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6223	Global Talent Management	
HRMG 6230	Leading a Diverse and Inclusive Organization	
HRMG 6280	The Human Side of Innovation	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	
STRT 6224	Managing the Sustainable Global Enterprise	

Note: Only one course outside HRMG and MGMT may be taken to fulfill the concentration.

**CONCENTRATION IN MARKETING**

Code	Title	Hours
<b>Required</b>		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	

MKTG 6212	International Marketing
MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy
MKTG 6218	Managing Customer Engagement in a Service World
MKTG 6222	Digital Marketing
MKTG 6223	Brand and Advertising Management
MKTG 6224	B2B and Strategic Sales
MKTG 6226	Consumer Behavior
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6234	Marketing Analytics
MKTG 6287	Succeeding in the Platform Economy

**CONCENTRATION IN MARKETING ANALYTICS**

Code	Title	Hours
<b>Required</b>		
MKTG 6234	Marketing Analytics	3
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		6
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

**CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
SCHM 6213	Global Supply Chain Strategy	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

**CONCENTRATION IN SUSTAINABILITY AND BUSINESS**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6200	Global Competition and Market Dominance	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	
STRT 6224	Managing the Sustainable Global Enterprise	

**CONCENTRATION IN MBA X ARTIFICIAL INTELLIGENCE**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5170	Artificial Intelligence for Human-Computer Interaction	4
CS 6140	Machine Learning	4

**CONCENTRATION IN MBA X BIOINFORMATICS**

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6310	Introduction to Computational Methods in Bioinformatics	4
BINF 6400	Genomics in Bioinformatics	4

**CONCENTRATION IN MBA X BIOTECHNOLOGY INDUSTRY**

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
In consultation with advisor, complete 1 graduate-level semester hour of BUSN courses for which prerequisites have been met.		1

**CONCENTRATION IN MBA X CYBERSECURITY**

Code	Title	Hours
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
CY 5250	Decision Making for Critical Infrastructure	4
CY 6760	Wireless and Mobile Systems Security	4

**CONCENTRATION IN MBA X DATA SCIENCE**

Code	Title	Hours
DS 5110	Introduction to Data Management and Processing	4
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4

**CONCENTRATION IN MBA X DATA VISUALIZATION**

Code	Title	Hours
<b>Required</b>		
ARTG 5150	Information Visualization Principles and Practices	3
ARTG 5151	Information Design Critique Seminar	1
ARTG 5330	Visualization Technologies 1: Fundamentals	4
<b>Elective</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

**CONCENTRATION IN MBA X EXPERIENCE DESIGN**

Code	Title	Hours
<b>Required</b>		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
<b>Elective</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	

**CONCENTRATION IN MBA X EXTENDED REALITIES**

Code	Title	Hours
<b>Required</b>		
EXRE 5010	Immersive Media: Extended Realities (XR) History, Theory, and Impact	4
<b>Elective</b>		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
EXRE 5020	Developing Extended Realities (XR)	
EXRE 5030	Designing Extended Realities (XR)	

EXRE 5973	Topics in Extended Realities (XR)	
GSND 6520	3D Modeling and Asset Creation Principles	
<b>CONCENTRATION IN MBA X GAME DESIGN</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Required</b>		
GSND 5110	Game Design and Analysis	4
<b>Elective</b>		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	
<b>CONCENTRATION IN MBA X GAME SCIENCE</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Required</b>		
GSND 5110	Game Design and Analysis	4
<b>Elective</b>		
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
<b>CONCENTRATION IN MBA X INFORMATION ETHICS</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met:		8
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
PHIL 5001	Global Justice	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
<b>CONCENTRATION IN MBA X MEDIA INNOVATION AND ADVOCACY</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Required</b>		
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
<b>Elective</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	
<b>CONCENTRATION IN MBA X PUBLIC HEALTH</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 6208	Urban Community Health Assessment	3

**CONCENTRATION IN MBA X SOFTWARE DEVELOPMENT**

Code	Title	Hours
CS 5500	Foundations of Software Engineering	4
CS 5520	Mobile Application Development	4
CS 5610	Web Development	4

**Business Administration, MBA—Online**

Northeastern University's D'Amore-McKim School of Business prepares business leaders to navigate the challenges of today's tech-forward business world. D'Amore-McKim's Online MBA ([https://damore-mckim.northeastern.edu/programs/online-mba/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=ombma](https://damore-mckim.northeastern.edu/programs/online-mba/?utm_medium=website&utm_source=catalog&utm_campaign=ombma)) program helps students build broad business skill sets and specialized knowledge in their field. In this flexible program, students build skills that they can apply in real-time—and complete their degree 100% online in as little as 18 months.

**Integrate Classroom and Professional Experiences**

Learning by doing is a hallmark of a Northeastern University MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students gain unique perspectives as they learn from entrepreneurs and executives at top firms who have led through times of rapid change.

**Live Faculty Connect Sessions**

Optional live faculty sessions offer a collaborative and interactive learning environment where students can connect with their professors and peers weekly to discuss course concepts, receive feedback, and gain valuable insights.

**EXPO Courses**

In the EEBA 6401 Experiential Business Decision Making course, students take on the role of a C-suite business executive and tackle a real business challenge for an actual company, all while gaining real-time feedback from a seasoned C-suite executive.

**Societal Challenge Courses**

In the societal challenge courses, students build upon the skills gained in the core course focusing on stakeholder values and societal challenges by selecting either a diversity, equity, and inclusion course or a sustainability course. The skills gained through these courses are designed to prepare students for immediate impact and are exactly what employers are seeking.

In the EEBA 6403 EXPO Challenge: Diversity, Equity, and Inclusion course, students work as a team to solve a DEI-related business problem. The course format includes case studies, Q&A sessions, and guidance and feedback from industry experts and seasoned faculty members.

In the EEBA 6402 EXPO Challenge: Sustainability course, students work in teams to bring their experience and newly learned skills to solve a real sustainability-related business problem. These problems could range from environmental sustainability issues to societal challenges associated with climate change. The course format includes case studies, Q&A sessions, and guidance and feedback from industry experts and seasoned faculty members.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Business Core Requirements**

Code	Title	Hours
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
EEBA 6401	Experiential Business Decision Making	3
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
INNO 6318	Innovation Driven Strategy	2
MKTG 6318	Customer Value and the Enterprise	2
SCHM 6318	Managing Operations and the Supply Chain	2
STRT 6318	Strategic Planning for the Future	2

**Societal Challenges Core**

Code	Title	Hours
BUSN 6402	Stakeholder Values and Societal Challenges in Business	2
In consultation with advisor, complete one of the following:		2
EEBA 6402	EXPO Challenge: Sustainability	
EEBA 6403	EXPO Challenge: Diversity, Equity, and Inclusion	

**Business Electives**

Code	Title	Hours
In consultation with advisor, complete 24 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		24
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE		
In consultation with advisor, complete 5 semester hours of experiential elective coursework.		5
EEBA 6401	Experiential Business Decision Making	

**Program Credit/GPA Requirements**

50 total semester hours required  
Minimum 3.000 GPA required

**Business Administration, MBA—Part-Time**

Northeastern University's D'Amore-McKim School of Business prepares business leaders to navigate the challenges of today's tech-forward business world. D'Amore-McKim's Part-Time MBA ([https://damore-mckim.northeastern.edu/programs/part-time-mba/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=part-time-mba](https://damore-mckim.northeastern.edu/programs/part-time-mba/?utm_medium=website&utm_source=catalog&utm_campaign=part-time-mba)) program helps students build broad business skill sets and specialized knowledge in their field. In this flexible program, students build skills they can apply in real time—and complete their degree part-time.

**Integrate Classroom and Professional Experiences**

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students gain unique perspectives as they learn from entrepreneurs and executives at top firms who have led through times of rapid change.

**Select Up to Two Concentrations**

Students may specialize their degree by selecting up to two in-demand business concentrations. Students gain exposure to diverse perspectives as they build competencies in multiple disciplines. This combination prepares them to lead in a complex business world.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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**Core Requirements**

Code	Title	Hours
<b>Accounting</b>		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
<b>Management</b>		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Marketing</b>		

MECN 6200	Global Competition and Market Dominance	3
MKTG 6200	Creating and Sustaining Customer Markets	3
<b>Finance</b>		
FINA 6200	Value Creation through Financial Decision Making	3
<b>Entrepreneurship</b>		
INNO 6200	Enterprise Growth and Innovation	3

## Optional Concentration

Students may complete up to two of the following concentrations. Courses taken to fulfill concentrations may be used toward the elective section below.

- Analytics (p. 289)
- Brand Management (p. 290)
- Business Management for Healthcare (p. 290)
- Corporate Finance (p. 290)
- Corporate Innovation (p. 290)
- Corporate Renewal (p. 291)
- Entrepreneurship (p. 291)
- International Business (p. 291)
- Investments (p. 292)
- Leading People and Organizations (p. 292)
- Marketing (p. 292)
- Marketing Analytics (p. 292)
- Mutual Fund Management (p. 293)
- Operation and Supply Chain Management (p. 293)
- Sustainability and Business (p. 293)

## Electives

Code	Title	Hours
In consultation with advisor, complete 27 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, SCHM, and STRT		

No more than 6 semester hours can be drawn from 1-semester-hour courses.

## Program Credit/GPA Requirements

60 semester hours required  
Minimum 3.000 GPA required

### CONCENTRATION IN ANALYTICS

Code	Title	Hours
<b>Required</b>		
MISM 6200 Introduction to Business Analytics		
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		
MISM 6202	Foundations of Data Analysis for Business	3
MISM 6205	Data Wrangling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

**CONCENTRATION IN BRAND MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
MKTG 6223	Brand and Advertising Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

**CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE**

Code	Title	Hours
<b>Required</b>		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
<b>Elective</b>		
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

**CONCENTRATION IN CORPORATE FINANCE**

Code	Title	Hours
<b>Required</b>		
FINA 6205	Financial Strategy	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	

**CONCENTRATION IN CORPORATE INNOVATION**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ARTG 5610	Design Systems	

GE 5100	Product Development for Engineers
HRMG 6212	Creating an Innovative Organization
HRMG 6280	The Human Side of Innovation
INNO 6217	Lean Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets
INNO 6225	Acquisitions, Alliances, and Growth
INNO 6230	Platform Innovation
MGMT 6280	Innovation for Next-Generation Products and Systems

**CONCENTRATION IN CORPORATE RENEWAL**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ENTR 6214	Social Enterprise	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
MKTG 6216	Market Focused Strategy	

**CONCENTRATION IN ENTREPRENEURSHIP**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

**CONCENTRATION IN INTERNATIONAL BUSINESS**

Code	Title	Hours
<b>Required</b>		
INTB 6212	Cultural Aspects of International Business	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
INNO 6225	Acquisitions, Alliances, and Growth	
INTB 6217		
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6249	Digitization of International Business	

MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

**CONCENTRATION IN INVESTMENTS**

Code	Title	Hours
<b>Required</b>		
FINA 6203	Investment Analysis	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours hours from the following for which prerequisites have been met:		6
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6292	Advanced Topics in Finance	

**CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours hours from the following for which prerequisites have been met:		
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

**CONCENTRATION IN MARKETING**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours hours from the following for which prerequisites have been met:		
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

**CONCENTRATION IN MARKETING ANALYTICS**

Code	Title	Hours
<b>Required</b>		
MKTG 6234	Marketing Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours hours from the following for which prerequisites have been met:		
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	

MKTG 6222	Digital Marketing
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit

**CONCENTRATION IN MUTUAL FUND MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
FINA 6203	Investment Analysis	3
FINA 6219	Portfolio Management	3
<b>Electives</b>		
Complete 3 semester hours through our student-managed mutual fund. Each course is 1 semester hour and may be taken multiple times. At least 1 semester hour must be as a fund manager (FINA 6361).		3
FINA 6360 or FINA 6361	Fund Management for Analysts Fund Management for Managers	

**CONCENTRATION IN OPERATION AND SUPPLY CHAIN MANAGEMENT**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
SCHM 6211	Logistics and Transportation Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

**CONCENTRATION IN SUSTAINABILITY AND BUSINESS**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217		
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

**Combined Degrees**

Northeastern University's D'Amore-McKim School of Business prepares leaders with deep business expertise. Our interdisciplinary combined degrees merge courses from two powerful D'Amore-McKim degree programs—the foundation of business expertise from our renowned MBA and deep skills of a specialized master's degree. Students complete their course of study by earning one combined degree.

Integrating classroom instruction with authentic, experience-powered learning is what we do best at D'Amore-McKim. It's an approach that expands students' knowledge base, develops their creative mindset, and prepares them to meet the shifting demands of today's business world. Students in our combined degree programs will have opportunities to dive headfirst into experiences that will give them fresh perspectives and in-demand skills.

Combined degree programs merge many core requirements from a D'Amore-McKim MBA with a specialized master's degree, allowing students to finish their program in less time than it would take to earn the two degrees separately. With this unique blend of knowledge, students become adaptable leaders prepared to navigate the complexity of decision making and tackle global business challenges head-on.

Students enroll in combined degree programs for full-time or part-time study.

**Programs**

- Accounting and Business Administration, MSAMBA (p. 294)
- Finance and Business Administration, MSF MBA (p. 296)
- Finance and Business Administration, MSF MBA—Online (p. 304)

- Finance and Business Administration, MSFMBA—Part-Time (p. 305)
- Quantitative Finance and Business Administration, MSFMBA (p. 311)

## Accounting and Business Administration, MSAMBA

### Overview

Northeastern University D'Amore-McKim School of Business' Master of Science in Accounting/Master of Business Administration (<https://damore-mckim.northeastern.edu/programs/ms-accounting-mba/>) combined-degree program puts nonaccounting majors on an accelerated path toward a successful career in accounting.

### CULTIVATE DEEP ACCOUNTING KNOWLEDGE AND FUNDAMENTAL BUSINESS SKILLS

This 15-month curriculum is constructed in partnership with some of the leading accounting firms. Students will build knowledge in both accounting and business, including a four-course concentration in business analytics.

### ANALYTICS CONCENTRATION

Students will develop their analytical skills through an MBA concentration in analytics. Through four courses students use data to support business decision making and create a measurable improvement on organizational performance.

### INTEGRATE CLASSROOM AND PROFESSIONAL EXPERIENCES

Students will have opportunities to obtain real-world experiences that help them gain a fresh perspective while using relevant skills. They apply their knowledge to actual business challenges through class projects. Starting in January, students leverage their newly acquired skills in a three-month paid corporate residency at a Big 4 or another top accounting firm. Far removed from the typical internship, students work full-time as an associate and have significant responsibilities to deliver on organizational goals.

Students may enroll in this 68-semester-hour master's degree program for full-time study.

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Business Administration Core Requirements

Code	Title	Hours
<b>Marketing</b>		
MKTG 6318	Customer Value and the Enterprise	2
<b>Strategic Decision Making</b>		
STRT 6318	Strategic Planning for the Future	2
<b>Management</b>		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
<b>Innovation and Social Impact</b>		
INNO 6318	Innovation Driven Strategy	2
MGMT 6211	Business Law and Professional Ethics	2

### Accounting Requirements

Code	Title	Hours
<b>Required</b>		
ACCT 6223	Audit and Other Assurance Services	6
ACCT 6224	Taxation of Individuals and Business Entities	6
ACCT 6226	Strategic Cost Management	3
ACCT 6227	Accounting for Business Combinations	3
ACCT 6228	Contemporary Issues in Accounting Theory	3
<b>Financial Reporting</b>		

ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6220	Corporate Financial Reporting and Decision Making 1	3
ACCT 6221	Corporate Financial Reporting and Decision Making 2	6
ACCT 6222	Corporate and Governmental/Nonprofit Financial Reporting and Decision Making	6

### Analytics Concentration Requirements

Code Required	Title	Hours
BUSN 6365	Business Analytics	3
MGSC 6201	Information Systems and Technology	3
MISM 6210	Information Visuals and Dashboards for Business	3
MISM 6212	Data Mining and Machine Learning for Business	3

### Elective

Code	Title	Hours
<b>Open Elective</b>		
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites are met. Choose from the following subject codes:		3

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

### Corporate Residency Requirement

Code	Title	Hours
BUSN 6964	Co-op Work Experience	0

### Program Credit/GPA Requirements

68 total semester hours required

Minimum 3.000 GPA required

### Plan of Study

Code	Title	Hours
<i>Summer 1</i>		
ACCT 6220	Corporate Financial Reporting and Decision Making 1	3
HRMG 6318	Managing the Organization	2
<i>Summer 2</i>		
ACCT 6221	Corporate Financial Reporting and Decision Making 2	6
BUSN 6365	Business Analytics	3
INNO 6318	Innovation Driven Strategy	2
<i>Fall</i>		
ACCT 6222	Corporate and Governmental/Nonprofit Financial Reporting and Decision Making	6
ACCT 6223	Audit and Other Assurance Services	6
ACCT 6224	Taxation of Individuals and Business Entities	6
MGSC 6201	Information Systems and Technology	3
MISM 6201	Database Management for Business	3
<i>Spring</i>		
ACCT 6226	Strategic Cost Management	3
BUSN 6964	Co-op Work Experience	0
MKTG 6318	Customer Value and the Enterprise	2
SCHM 6318	Managing Operations and the Supply Chain	2
<i>Summer 1</i>		
ACCT 6217	Corporate Governance, Ethics, and Financial Reporting	3
ACCT 6227	Accounting for Business Combinations	3
FINA 6318	Financial Management	2
MISM 6212	Data Mining and Machine Learning for Business	3
<i>Summer 2</i>		
ACCT 6228	Contemporary Issues in Accounting Theory	3

MGMT 6211	Business Law and Professional Ethics	2
STRT 6318	Strategic Planning for the Future	2
Elective		3
<b>Total Hours</b>		<b>68</b>

## Finance and Business Administration, MSFMBA

### Overview

Northeastern University's D'Amore-McKim School of Business prepares resilient finance leaders to weather a changing business world. The Full-Time MS in Finance/MBA ([https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=ftmsfmiba](https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=ftmsfmiba)) combined degree program integrates business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands.

### Integrating Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students will gain invaluable experience at the intersection of business and finance through a corporate residency, translating ideas into action for three, six, or up to 12 months. Far removed from the typical internship, students work full-time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

### Develop Deep Finance Expertise

Students pursue a major in finance laser-focused on financial theory and practice. Students gain advanced financial skills and high-level knowledge to drive financial strategy, increase shareholder value, support flexible operating models, minimize risk, and maximize revenue through their finance courses.

Students can gain valuable experience performing equity research and portfolio management in a student-managed mutual fund, the 360 Huntington Fund. By participating in the Fund, students may complete 1 semester hour of coursework, with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

### Select a Concentration

Students specialize their degree by selecting a concentration. Our faculty recommend the analytics concentration. Or, students may choose another in-demand business concentration or add expertise in another professional area by choosing an interdisciplinary MBA x concentration offered through partnerships with other Northeastern colleges.

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Business Administration Core Requirements

Code	Title	Hours
<b>Marketing</b>		
MKTG 6318	Customer Value and the Enterprise	2
<b>Strategic Decision Making</b>		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
<b>Management</b>		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2
SCHM 6318	Managing Operations and the Supply Chain	2
<b>Innovation and Social Impact</b>		
BUSN 6363	Social Impact of Business	2
INNO 6318	Innovation Driven Strategy	2
<b>Career Management</b>		
BUSN 6200	Career Management	0

BUSN 6950	MBA Skills Workshop	0
<b>Corporate Residency</b>		
BUSN 6954	Co-op Work Experience - Half-Time	0
BUSN 6964	Co-op Work Experience	0
BUSN 6970	Professional Projects	0
Three-month, six-month, or two six-month corporate residency placement options		

## Finance Major Requirements

Code	Title	Hours
<b>Required</b>		
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3
FINA 6320	Advanced Financial Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours of FINA courses for which prerequisites have been met.		6

## Concentration Options

Complete one of the following concentrations:

- Analytics (p. 297) (*Recommended*)
- Brand Management (p. 298)
- Business Management for Healthcare (p. 298)
- Corporate Innovation (p. 298)
- Entrepreneurship (p. 299)
- International Business (p. 299)
- Leading People and Organizations (p. 299)
- Marketing (p. 300)
- Marketing Analytics (p. 300)
- Operations and Supply Chain Management (p. 300)
- Sustainability and Business (p. 300)
- MBA x Artificial Intelligence (p. 301)
- MBA x Bioinformatics (p. 301)
- MBA x Biotechnology Industry (p. 301)
- MBA x Cybersecurity (p. 301)
- MBA x Data Science (p. 301)
- MBA x Data Visualization (p. 301)
- MBA x Experience Design (p. 301)
- MBA x Game Design and Analytics (p. 302)
- MBA x Information Ethics (p. 302)
- MBA x Media Innovation and Advocacy (p. 302)
- MBA x Public Health
- MBA x Software Development (p. 302)

### CONCENTRATION IN ANALYTICS

Code	Title	Hours
<b>Required</b>		
BUSN 6365	Business Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
ECON 5140	Applied Econometrics	

IE 6600	Computation and Visualization for Analytics
INSH 5302	Information Design and Visual Analytics
MISM 6205	Data Wrangling for Business
MISM 6210	Information Visuals and Dashboards for Business
MISM 6212	Data Mining and Machine Learning for Business
MISM 6213	Business Information Design, Quality, and Strategy
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6234	Marketing Analytics
SCHM 6215	Supply Chain Analytics
STRT 6210	Workforce Metrics and Analytics

**CONCENTRATION IN BRAND MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
MKTG 6223	Brand and Advertising Management	3
MKTG 6320	Advanced Marketing Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

**CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE**

Code	Title	Hours
<b>Required</b>		
FINA 6220 or SCHM 6223	Healthcare Finance Managing Healthcare Supply Chain Operations	3
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
<b>Optional Electives</b>		
Note: Electives are not required; the following course(s) are suggested beyond the concentration:		3-9
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

**CONCENTRATION IN CORPORATE INNOVATION**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6280	The Human Side of Innovation	

INNO 6217	Lean Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets
INNO 6225	Acquisitions, Alliances, and Growth
INNO 6230	Platform Innovation
MGMT 6280	Innovation for Next-Generation Products and Systems
MGSC 6281	Service Innovation and Management

**CONCENTRATION IN ENTREPRENEURSHIP**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	
ENTR 6250	Lean Design and Development	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
FINA 6260	Entrepreneurial Finance and Venture Capital	
GE 5030	Iterative Product Prototyping for Engineers	
INNO 6230	Platform Innovation	
MKTG 6214	New Product Development	

**CONCENTRATION IN INTERNATIONAL BUSINESS**

Code	Title	Hours
<b>Required</b>		
INTB 6200	Managing the Global Enterprise	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
FINA 6204	International Financial Management	
INTB 6212	Cultural Aspects of International Business	
INTB 6224	Competing to Win in Emerging Markets	
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6238	Global Project	
MKTG 6212	International Marketing	

**CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS**

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6223	Global Talent Management	
HRMG 6230	Leading a Diverse and Inclusive Organization	
HRMG 6280	The Human Side of Innovation	
INTB 6226	Becoming a Global Leader	
MGMT 6214	Negotiations	
STRT 6210	Workforce Metrics and Analytics	

Note: Only one course outside HRMG and MGMT may be taken to fulfill the concentration.

**CONCENTRATION IN MARKETING**

Code	Title	Hours
<b>Required</b>		
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	

**CONCENTRATION IN MARKETING ANALYTICS**

Code	Title	Hours
<b>Required</b>		
MKTG 6234	Marketing Analytics	3
MKTG 6320	Advanced Marketing Management (Advanced Marketing Management)	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following:		6
MKTG 6120	Graduate Research Practicum in Marketing	
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

**CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
SCHM 6213	Global Supply Chain Strategy	3
<b>Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met. Choose from the following:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

**CONCENTRATION IN SUSTAINABILITY AND BUSINESS**

Code	Title	Hours
<b>Required</b>		
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met. Choose from the following:		12
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
INTB 6217		
MECN 6200	Global Competition and Market Dominance	

MECN 6205	Sustainability and the Economics of Markets
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment
SCHM 6221	Sustainability and Supply Chain Management

**CONCENTRATION IN MBA X ARTIFICIAL INTELLIGENCE**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 5170	Artificial Intelligence for Human-Computer Interaction	4
CS 6140	Machine Learning	4

**CONCENTRATION IN MBA X BIOINFORMATICS**

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4

**CONCENTRATION IN MBA X BIOTECHNOLOGY INDUSTRY**

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 6214	Experimental Design and Biostatistics	2
Complete 1 additional semester hour of BUSN coursework.		1

**CONCENTRATION IN MBA X CYBERSECURITY**

Code	Title	Hours
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
CY 5250	Decision Making for Critical Infrastructure	4
CY 6760	Wireless and Mobile Systems Security	4

**CONCENTRATION IN MBA X DATA SCIENCE**

Code	Title	Hours
DS 5110	Introduction to Data Management and Processing	4
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4

**CONCENTRATION IN MBA X DATA VISUALIZATION**

Code	Title	Hours
<b>Required</b>		
ARTG 5150	Information Visualization Principles and Practices	3
ARTG 5151	Information Design Critique Seminar	1
ARTG 5330	Visualization Technologies 1: Fundamentals	4
<b>Electives</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met. Choose from the following:		4
ARTG 5310	Visual Cognition	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6330	Information Design Mapping Strategies	

**CONCENTRATION IN MBA X EXPERIENCE DESIGN**

Code	Title	Hours
<b>Required</b>		
ARTG 5610	Design Systems	4
ARTG 6310	Design for Behavior and Experience	4
<b>Electives</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met. Choose from the following:		4

ARTG 5600	Experience Design Studio 1: Principles
ARTG 5620	Notational Systems for Experience
ARTG 5640	Prototyping for Experience Design

**CONCENTRATION IN MBA X GAME DESIGN AND ANALYTICS**

Code	Title	Hours
<b>Required</b>		
GSND 5110	Game Design and Analysis	4
GSND 6350	Data-Driven Player Modeling	4
<b>Electives</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met. Choose from the following:		4
GSND 6320	Psychology of Play	
GSND 6330	Player Experience	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	

**CONCENTRATION IN MBA X INFORMATION ETHICS**

Code	Title	Hours
In consultation with advisor, complete 8 graduate-level semester hours for which prerequisites have been met. Choose from the following:		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met. Choose from the following:		4
PHIL 5001	Global Justice	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

**CONCENTRATION IN MBA X MEDIA INNOVATION AND ADVOCACY**

Code	Title	Hours
<b>Required</b>		
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 6340	Fundamentals of Digital Journalism	4
<b>Electives</b>		
In consultation with advisor, complete 4 graduate-level semester hours for which prerequisites have been met. Choose from the following:		4
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
JRNL 5311	Design for Storytelling	
JRNL 6305	Topics	
JRNL 6341	Telling Your Story with Data	

**CONCENTRATION IN MBA X PUBLIC HEALTH**

Code	Title	Hours
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 6208	Urban Community Health Assessment	3

**CONCENTRATION IN MBA X SOFTWARE DEVELOPMENT**

Code	Title	Hours
CS 5500	Foundations of Software Engineering	4
CS 5520	Mobile Application Development	4
CS 5610	Web Development	4

**ELECTIVES**

Code	Title	Hours
<b>Experiential Requirement</b>		
In consultation with advisor, complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
ENTR 5000	New Venture Development	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
INTB 6230	Global Field Study	
INTB 6238	Global Project	
MKTG 6606	Digital, Analytics, Technology, and Automation Advanced Research Practicum	
<b>Open Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		6
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, SCHM, and STRT		
<b>Interdisciplinary Requirement</b>		
In consultation with advisor, complete 6 graduate-level semester hours, for which the requirements have been met, offered in partnership with other Northeastern University colleges. Choose from the following:		6
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	
BINF 6309	Bioinformatics Computational Methods 2	
BIOT 5120	Foundations in Biotechnology	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5400	Scientific Information Management for Biotechnology Managers	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 6214	Experimental Design and Biostatistics	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
DS 5110	Introduction to Data Management and Processing	
ECON 5140	Applied Econometrics	
GE 5030	Iterative Product Prototyping for Engineers	
GE 5100	Product Development for Engineers	
GSND 5110	Game Design and Analysis	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5105	The American Healthcare System	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
IE 5617	Lean Concepts and Applications	

IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 6600	Computation and Visualization for Analytics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7374	Special Topics in Industrial Engineering
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

## Program Credit/GPA Requirements

67 semester hours required

Minimum 3.000 GPA required

## Finance and Business Administration, MSFMBA—Online

### Overview

Northeastern University's D'Amore-McKim School of Business prepares leaders highly skilled in finance and business. Our Online Master of Science in Finance/Master of Business Administration ([https://damore-mckim.northeastern.edu/programs/online-ms-finance-mba/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=onlinemsfmba](https://damore-mckim.northeastern.edu/programs/online-ms-finance-mba/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=onlinemsfmba)) combined degree program integrates business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands. In this flexible program, students build skills that they can apply in real time—and complete their degree virtually.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6272	Financial Statement Preparation and Analysis	2.25
ACCT 6273	Identifying Strategic Implications in Accounting Data	2.25
<b>Management</b>		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGMT 6213	Managing Ethics in the Workplace and Marketplace	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
<b>Marketing</b>		
MECN 6200	Global Competition and Market Dominance	3

MKTG 6200	Creating and Sustaining Customer Markets	3
<b>Analysis</b>		
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Entrepreneurship</b>		
INNO 6200	Enterprise Growth and Innovation	3
<b>Finance</b>		
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3
<b>Electives</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Finance Electives</b>		
In consultation with advisor, complete 9 graduate-level semester hours of FINA courses for which prerequisites have been met.		9
<b>Business Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, TECE		

## Program Credit/GPA Requirements

63 semester hours required

Minimum 3.000 GPA required

### Finance and Business Administration, MSF MBA—Part-Time

Northeastern University's D'Amore-McKim School of Business prepares leaders highly skilled in finance and business. D'Amore-McKim's Part-Time MS in Finance/MBA ([https://damore-mckim.northeastern.edu/programs/part-time-ms-finance-mba/?utm\\_source=internal-referral&utm\\_medium=nucatalog&utm\\_campaign=ptmsfmba](https://damore-mckim.northeastern.edu/programs/part-time-ms-finance-mba/?utm_source=internal-referral&utm_medium=nucatalog&utm_campaign=ptmsfmba)) combined degree program integrates business knowledge with a deep understanding of finance, preparing students to be the leaders that today's business world demands. In this flexible program, students build skills they can apply in real time—and complete their degree part-time.

### Integrating Classroom and Professional Experiences

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students benefit from the experience of their faculty as finance experts and business leaders who understand today's challenges because they've experienced them firsthand.

### Develop Deep Finance Expertise

Students pursue a major in finance laser-focused on financial theory and practice. Students have an opportunity to gain advanced financial skills and high-level knowledge to drive financial strategy, increase shareholder value, support flexible operating models, minimize risk, and maximize revenue through the finance courses.

Students can gain experience performing equity research and portfolio management in a student-managed mutual fund, The 360 Huntington Fund. By participating in the Fund, students may earn one semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

### Select a Concentration

Students specialize their degree by selecting a concentration. They gain exposure to diverse perspectives as they build competencies in multiple disciplines. This combination of their finance major and a concentration of their choosing prepares them to lead in a complex business world.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
<b>Accounting</b>		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
<b>Management</b>		
HRMG 6200	Managing People and Organizations	3
INTB 6200	Managing the Global Enterprise	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5
SCHM 6201	Operations and Supply Chain Management	3
STRT 6200	Strategic Decision Making in a Changing Environment	3
<b>Marketing</b>		
MECN 6200	Global Competition and Market Dominance	3
MKTG 6200	Creating and Sustaining Customer Markets	3
<b>Entrepreneurship</b>		
INNO 6200	Enterprise Growth and Innovation	3
<b>Finance</b>		
FINA 6200	Value Creation through Financial Decision Making	3
FINA 6203	Investment Analysis	3
FINA 6204	International Financial Management	3
FINA 6205	Financial Strategy	3
FINA 6206	Finance Seminar	3

## Optional Concentrations

Students may complete up to two of the following concentrations. Courses taken to fulfill concentrations may be used toward the electives section below.

- Analytics (p. 307)
- Brand Management (p. 307)
- Business Management for Healthcare (p. 307)
- Corporate Finance (p. 308)
- Corporate Innovation (p. 308)
- Corporate Renewal (p. 308)
- Entrepreneurship (p. 308)
- International Business (p. 309)
- Investments (p. 309)
- Leading People and Organizations (p. 309)
- Marketing (p. 310)
- Marketing Analytics (p. 310)
- Mutual Fund Management (p. 310)
- Operations and Supply Chain Management (p. 310)
- Sustainability and Business (p. 311)

## Electives

Code	Title	Hours
<b>Finance Electives</b>		
In consultation with advisor, complete 12 graduate-level semester hours of FINA courses for which prerequisites have been met.		12
<b>Business Electives</b>		
In consultation with advisor, complete 15 graduate-level semester hours from the following for which prerequisites have been met:		15

ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MISM, MKTG, SCHM, and STRT

## Program Credit/GPA Requirements

72 total semester hours required  
Minimum 3.000 GPA required

### CONCENTRATION IN ANALYTICS

Code	Title	Hours
<b>Required</b>		
MISM 6200	Introduction to Business Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6205	Data Wrangling for Business	
MISM 6206	Modeling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
SCHM 6215	Supply Chain Analytics	
STRT 6210	Workforce Metrics and Analytics	

### CONCENTRATION IN BRAND MANAGEMENT

Code	Title	Hours
<b>Required</b>		
MKTG 6223	Brand and Advertising Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6287	Succeeding in the Platform Economy	

### CONCENTRATION IN BUSINESS MANAGEMENT FOR HEALTHCARE

Code	Title	Hours
<b>Required</b>		
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3
<b>Elective</b>		
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
ENTR 6214	Social Enterprise	
FINA 6220	Healthcare Finance	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 6202	Business of Healthcare Informatics	
HINF 6205	Creation and Application of Medical Knowledge	
MGMT 6214	Negotiations	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	

PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
SCHM 6223	Managing Healthcare Supply Chain Operations

**CONCENTRATION IN CORPORATE FINANCE**

Code	Title	Hours
<b>Required</b>		
FINA 6205	Financial Strategy	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6342	Financial Data and Fintech	

**CONCENTRATION IN CORPORATE INNOVATION**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
ARTG 5610	Design Systems	
GE 5100	Product Development for Engineers	
HRMG 6212	Creating an Innovative Organization	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6280	The Human Side of Innovation	
INNO 6217	Lean Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6227	Digital Bias in Business	
INNO 6230	Platform Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	

**CONCENTRATION IN CORPORATE RENEWAL**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
ENTR 6214	Social Enterprise	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
MKTG 6216	Market Focused Strategy	

**CONCENTRATION IN ENTREPRENEURSHIP**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	

ENTR 6214	Social Enterprise
ENTR 6218	Business Model Design and Innovation
ENTR 6219	Financing Ventures from Early Stage to Exit
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
FINA 6260	Entrepreneurial Finance and Venture Capital
GE 5030	Iterative Product Prototyping for Engineers
HRMG 6222	The Entrepreneurial Mindset of Leaders
INNO 6230	Platform Innovation
MKTG 6214	New Product Development

**CONCENTRATION IN INTERNATIONAL BUSINESS**

Code	Title	Hours
<b>Required</b>		
INTB 6212	Cultural Aspects of International Business	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
INNO 6225	Acquisitions, Alliances, and Growth	
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6249	Digitization of International Business	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	
STRT 6224	Managing the Sustainable Global Enterprise	

**CONCENTRATION IN INVESTMENTS**

Code	Title	Hours
<b>Required</b>		
FINA 6203	Investment Analysis	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6292	Advanced Topics in Finance	
FINA 6339	Quantitative Portfolio Management	
FINA 6342	Financial Data and Fintech	

**CONCENTRATION IN LEADING PEOPLE AND ORGANIZATIONS**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6221	Power and Influence	
HRMG 6222	The Entrepreneurial Mindset of Leaders	
HRMG 6223	Global Talent Management	
INTB 6226	Becoming a Global Leader	

MGMT 6214	Negotiations
STRT 6210	Workforce Metrics and Analytics
STRT 6224	Managing the Sustainable Global Enterprise

**CONCENTRATION IN MARKETING**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
MKTG 6210	Marketing Research	
MKTG 6212	International Marketing	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6222	Digital Marketing	
MKTG 6223	Brand and Advertising Management	
MKTG 6224	B2B and Strategic Sales	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	
MKTG 6234	Marketing Analytics	
MKTG 6287	Succeeding in the Platform Economy	

**CONCENTRATION IN MARKETING ANALYTICS**

Code	Title	Hours
<b>Required</b>		
MKTG 6234	Marketing Analytics	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

**CONCENTRATION IN MUTUAL FUND MANAGEMENT**

Code	Title	Hours
<b>Required</b>		
FINA 6203	Investment Analysis	3
FINA 6339	Quantitative Portfolio Management	3
<b>Electives</b>		
Complete 3 semester hours through our student-managed mutual fund. Each course is 1 semester hour and may be taken multiple times. At least 1 semester hour must be as a fund manager (FINA 6361).		3
FINA 6360 or FINA 6361	Fund Management for Analysts Fund Management for Managers	

**CONCENTRATION IN OPERATIONS AND SUPPLY CHAIN MANAGEMENT**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
SCHM 6211	Logistics and Transportation Management	
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

**CONCENTRATION IN SUSTAINABILITY AND BUSINESS**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	
STRT 6224	Managing the Sustainable Global Enterprise	

**Quantitative Finance and Business Administration, MSFMBA**

Northeastern University's D'Amore-McKim School of Business positions students to become fintech leaders ready for the rapidly changing financial services industry. The Full-Time MS in Finance/MBA ([https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=ftmsfmiba](https://damore-mckim.northeastern.edu/programs/full-time-ms-finance-mba/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=ftmsfmiba)) combined degree program integrates business knowledge with advanced mathematical and technical skills.

**Integrating Classroom and Professional Experiences**

Learning by doing is a hallmark of a Northeastern MBA. Students apply their knowledge to actual business challenges through experience-fueled electives and class projects. Students will gain invaluable experience at the intersection of business and finance through a corporate residency, translating ideas into action for three, six, or up to 12 months. Far removed from the typical internship, students work full-time at a leading firm or startup in their field and have significant responsibilities as they work to deliver on organizational goals.

**Cultivate Advanced Finance and Fintech Skills**

Students pursue a major in quantitative finance that emphasizes the intersection of technology and business analytics with finance. Coursework integrates economics, mathematics, and computer science with financial theory and application. Students have an opportunity to develop mathematically demanding quantitative skills and fintech expertise.

Students can gain valuable experience performing equity research and portfolio management in a student-managed mutual fund, The 360 Huntington Fund. By participating in the Fund, students may earn 1 semester hour per semester with the option to fulfill a 3-semester-hour elective course requirement by participating for three terms.

**Select a Finance Concentration**

Students specialize their degree by selecting a corporate finance or investments concentration. In the corporate finance concentration, students master a range of financial, analytical, and communication skills for increasing profitability and shareholder value. In the investments concentration, students become knowledgeable managers of assets for individuals or institutions, building their expertise in capital allocation, valuation, or risk management.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Business Administration Core Requirements**

Code	Title	Hours
<b>Marketing</b>		
MKTG 6318	Customer Value and the Enterprise	2
<b>Strategic Decision Making</b>		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	2
STRT 6318	Strategic Planning for the Future	2
<b>Management</b>		
FINA 6318	Financial Management	2
HRMG 6318	Managing the Organization	2

SCHM 6318	Managing Operations and the Supply Chain	2
<b>Innovation and Social Impact</b>		
BUSN 6363	Social Impact of Business	2
INNO 6318	Innovation Driven Strategy	2
<b>Career Management</b>		
BUSN 6200	Career Management	0
BUSN 6950	MBA Skills Workshop	0
<b>Corporate Residency</b>		
BUSN 6954	Co-op Work Experience - Half-Time	0
BUSN 6964	Co-op Work Experience	0
BUSN 6970	Professional Projects	0
Three-month, six-month, or two six-month corporate residency placement options		

## Quantitative Finance Major Requirements

Code	Title	Hours
FINA 6203	Investment Analysis	3
FINA 6332	Fundamentals of Financial Math and Financial Markets	3
FINA 6333	Data Analytics in Finance	3
FINA 6334	Empirical Methods in Finance	3
FINA 6335	Derivatives and Risk Analytics	3
In consultation with advisor, complete 3 graduate-level semester hours in the FINA department for which prerequisites have been met.		3

## Concentration Options

Complete one of the following concentrations:

- Corporate Finance (p. 312)
- Investments (p. 313)

### CONCENTRATION IN CORPORATE FINANCE

Code	Title	Hours
<b>Required</b>		
FINA 6320	Advanced Financial Management	3
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
FINA 6203	Investment Analysis	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6260	Entrepreneurial Finance and Venture Capital	
MECN 6200	Global Competition and Market Dominance	

**CONCENTRATION IN INVESTMENTS**

Code	Title	Hours
<b>Required</b>		
FINA 6203	Investment Analysis	3
FINA 6320	Advanced Financial Management	3
<b>Electives</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		6
FINA 6204	International Financial Management	
FINA 6207	Financial Modeling	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6260	Entrepreneurial Finance and Venture Capital	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
MECN 6200	Global Competition and Market Dominance	

**Electives**

Code	Title	Hours
<b>Experiential Requirement</b>		
In consultation with advisor, complete 3 semester hours from the following:		3
BUSN 6351	Experiential Education	
BUSN 6945	Washington Campus Seminar	
ENTR 5000	New Venture Development	
FINA 6360	Fund Management for Analysts	
FINA 6361	Fund Management for Managers	
INTB 6230	Global Field Study	
INTB 6238	Global Project	
MKTG 6606	Digital, Analytics, Technology, and Automation Advanced Research Practicum	
<b>Open Electives</b>		
In consultation with advisor, complete 12 graduate-level semester hours from the following for which prerequisites have been met:		12
ACCT, BUSN, ENTR, FINA, HRMG, INNO, INTB, MECN, MGMT, MKTG, SCHM, and STRT		
<b>Interdisciplinary Requirements</b>		
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met, offered in partnership with other Northeastern University colleges:		6
AACE 6000	Arts and Culture Organizational Leadership	
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5151	Information Design Critique Seminar	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5620	Notational Systems for Experience	
ARTG 5640	Prototyping for Experience Design	
ARTG 6110	Information Design Theory and Critical Thinking	
ARTG 6310	Design for Behavior and Experience	
ARTG 6330	Information Design Mapping Strategies	
BINF 6200	Bioinformatics Programming	
BINF 6308	Bioinformatics Computational Methods 1	

BINF 6309	Bioinformatics Computational Methods 2
BIOT 5120	Foundations in Biotechnology
BIOT 5219	The Biotechnology Enterprise
BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production
BIOT 6214	Experimental Design and Biostatistics
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
DS 5110	Introduction to Data Management and Processing
ECON 5140	Applied Econometrics
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
GSND 5110	Game Design and Analysis
GSND 6320	Psychology of Play
GSND 6340	Biometrics for Design
GSND 6350	Data-Driven Player Modeling
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5105	The American Healthcare System
HINF 6202	Business of Healthcare Informatics
HINF 6205	Creation and Application of Medical Knowledge
IE 5617	Lean Concepts and Applications
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 6600	Computation and Visualization for Analytics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7374	Special Topics in Industrial Engineering
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
JRNL 5311	Design for Storytelling
JRNL 5400	Media and Advocacy in Theory and Practice
JRNL 6305	Topics
JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
ME 5645	Environmental Issues in Manufacturing and Product Use
PHIL 5001	Global Justice
PHIL 5005	Information Ethics
PHIL 5010	AI Ethics
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy

## Program Credit/GPA Requirements

67 total semester hours required

Minimum 3.000 GPA required

## Dual Degrees

Northeastern University's D'Amore-McKim School of Business prepares leaders with deep business expertise. Our interdisciplinary dual degree programs offer a powerful opportunity for students to build their future-forward business skills through an MBA and a deep foundation in a nonbusiness area. Dual degree students earn two degrees simultaneously—an MBA and a second degree in a nonbusiness field from another Northeastern school or college.

At Northeastern, experience is at the heart of everything we do. Our experience-powered educational model fuses robust classroom education with real-world application. Northeastern students benefit from opportunities to apply what they've learned in the classroom to real challenges in business and the industry of their second degree.

Dual degree programs merge many core requirements from a D'Amore-McKim MBA with a specialized master's degree, allowing students to finish their program in less time than it would take to earn the two degrees separately. This distinctive blend of knowledge and skill positions dual degree students to lead in two sectors.

Students enroll in dual degree programs for full-time study.

## Programs

- Law, JD / Accounting and Business Administration, MSAMBA (p. 315)
- Law, JD / Business Administration, MBA—Full-Time (p. 315)
- Law, LLM / Business Administration, MBA—Full-Time (p. 315)

### Law, JD / Accounting and Business Administration, MSAMBA

The Northeastern University School of Law and the D'Amore-McKim School of Business offer a combined degree that results in a Juris Doctor and Master of Science in Accounting and Business Administration. Students without a previous accounting background study how to operate effectively in specialized fields such as taxation law, corporate finance, or mergers and acquisitions. Students have an opportunity to gain advanced legal expertise alongside future-forward accounting and business knowledge.

Our combined degree program is a full-time, four-year course of study. Students usually complete two years of the law curriculum, followed by 15 months of the combined accounting and business administration curriculum, before returning to finish their studies at the School of Law.

Students gain valuable work experience in law and public accounting before they graduate. They can make a real impact during two co-ops in legal departments, law firms, government agencies, judges' chambers, or other legal settings. Students also experience working as an accounting associate during the busy tax season through a corporate residency at Big 4 or other globally known accounting firms.

Students concurrently pursue the two degrees and may count 12 semester hours of nonlaw coursework from the accounting and business administration curriculum toward the law curriculum. The corporate residency at an accounting firm may fulfill the requirement for the third co-op required for the law curriculum. Students are encouraged to consult their law advisor to select accounting and business classes that satisfy JD requirements.

### Law, JD / Business Administration, MBA—Full-Time

The JD/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to operate in increasingly interdependent legal and business spheres. As new technology disrupts industries and data availability and sophisticated use shifts the business landscape, our JD/MBA (<https://damore-mckim.northeastern.edu/programs/jd-mba/>) students prepare to guide corporate-level strategy and become the leaders businesses need.

Our JD/MBA program is a full-time, four-year course of study that includes three semester-long co-op work experiences arranged through Northeastern Law. Students complete three years of law school, taking a break after either year one or two to complete a year of business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they may add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may count 9 semester hours of nonlaw coursework from the JD curriculum toward the interdisciplinary and elective requirements of the MBA degree and up to 12 semester hours from the MBA curriculum toward the JD degree. Students should work with their MBA advisor to select JD courses that will fulfill MBA requirements and with their law advisor to choose MBA courses that will satisfy JD requirements.

### Law, LLM / Business Administration, MBA—Full-Time

## Law, LLM / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to harness legal and business skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, 20-month course of study. Students start taking classes in business school, take law courses next, and finish with business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by choosing an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

### **Law, LLM—Experiential / MBA**

The LLM/MBA dual degree is offered through a partnership between Northeastern Law and the D'Amore-McKim School of Business to position students to harness business and legal skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study that includes a semester-long co-op work experience arranged through Northeastern Law. During the course of their studies, students take classes in business school and the School of Law and complete a law co-op.

Students specialize their degree by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students will concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

## **Graduate Certificates**

Northeastern University's D'Amore-McKim School of Business helps professionals quickly develop the knowledge they need through short-term programs focused on a specific business area. Students in D'Amore-McKim's graduate certificates may choose to fill in gaps in their business knowledge or strengthen their skills in market-aligned areas to expand their career potential.

Here, students will have the opportunity to learn from our respected business faculty, many of whom are consultants, respected management leaders, and startup founders. Students will study alongside classmates with diverse backgrounds who share their passions and interests.

Students enroll in our 12–15 credit graduate certificate programs for full-time, part-time, or online study.

### **Programs**

- Accounting and Financial Decision Making, Graduate Certificate (p. 317)
- AI Applications, Graduate Certificate (p. 317)
- Brand Management, Graduate Certificate (p. 318)
- Business Administration, Graduate Certificate (p. 319)
- Business Administration, Graduate Certificate—Online (p. 320)
- Business Analytics, Graduate Certificate (p. 321)
- Business Management for Healthcare, Graduate Certificate (p. 322)
- Corporate Finance, Graduate Certificate (p. 323)
- Corporate Innovation, Graduate Certificate (p. 323)
- Corporate Renewal, Graduate Certificate (p. 324)
- Entrepreneurship, Graduate Certificate (p. 325)
- International Business, Graduate Certificate (p. 326)
- Investments, Graduate Certificate (p. 326)
- Leading People and Organizations, Graduate Certificate (p. 327)
- Marketing, Graduate Certificate (p. 328)
- Marketing Analytics, Graduate Certificate (p. 329)
- Mutual Fund Management, Graduate Certificate (p. 329)
- Supply Chain Management, Graduate Certificate (p. 330)
- Sustainability and Business, Graduate Certificate (p. 331)

## Accounting and Financial Decision Making, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Accounting and Financial Decision Making ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=gcafdm](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/accounting/?utm_medium=website&utm_source=catalog&utm_campaign=gcafdm)) helps students build critical skills for essential financial practices, positioning them for a managerial role. Students learn to see business problems clearly, identify the strategic implications of potential solutions, and develop innovative ways to achieve organizational goals.

In just five courses—with the option to take a sixth to deepen their learning—students will advance their understanding of critical financial practices and build the skills necessary to analyze financial statements, assess risk, and make informed decisions. Depending on the electives they choose, they'll explore critical topics in greater depth, such as resource acquisition, capital budgeting, and information technology.

Students may enroll in the Graduate Certificate in Accounting and Financial Decision Making for full-time or part-time study.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Core Requirements

Code	Title	Hours
ACCT 6200 and ACCT 6201	Financial Reporting and Managerial Decision Making 1 and Financial Reporting and Managerial Decision Making 2	4.5
FINA 6200	Value Creation through Financial Decision Making	3
MGSC 6200	Information Analysis	3

### Elective

Code	Title	Hours
In consultation with advisor, complete one graduate-level course for which prerequisites have been met. Some courses may fulfill requirements of the MBA program.		1.5-3
HRMG 6200	Managing People and Organizations	
INNO 6200	Enterprise Growth and Innovation	
INTB 6200	Managing the Global Enterprise	
MECN 6200	Global Competition and Market Dominance	
MGSC 6204	Managing Information Resources	
MKTG 6200	Creating and Sustaining Customer Markets	
STRT 6200	Strategic Decision Making in a Changing Environment	

### Program Credit/GPA Requirements

12 total semester hours required; may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

## AI Applications, Graduate Certificate

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- D'Amore-McKim School of Business
- Mills College at Northeastern

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

### Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		
EDUT 6150	AI in Education	4
HLTH 5800	AI Across the Health Sciences	
IE 5640	Data Mining for Engineering Applications	
JRNL 6460	AI in Media Industries	
MISM 6250	Strategic AI for Business	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Brand Management, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Brand Management ([https://damore-mckim.northeastern.edu/programs/brand-management-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=GCBM](https://damore-mckim.northeastern.edu/programs/brand-management-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=GCBM)) helps students create and manage brands that resonate with consumers. Students develop a strategic mindset and specialized skills equipped for today's dynamic digital marketing environment.

In just four courses—with an option to take a fifth to deepen your learning—you'll learn how to develop an integrated brand strategy that helps students position an organization for growth. Your coursework will explore the brand-building process across platforms, and you'll choose electives that take a deeper look at topics such as consumer behavior, marketing research, and innovation.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		
MKTG 6210	Marketing Research	
MKTG 6214	New Product Development	
MKTG 6218	Managing Customer Engagement in a Service World	
MKTG 6226	Consumer Behavior	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

## Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

### Business Administration, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Business Administration ([https://damore-mckim.northeastern.edu/programs/business-administration-certificate/?utm\\_medium=content&utm\\_source=catalog&utm\\_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcbaa-con-2022\\_02\\_25-gcba\\_catalog](https://damore-mckim.northeastern.edu/programs/business-administration-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcbaa-con-2022_02_25-gcba_catalog)) helps students gain forward-thinking, relevant, in-demand business skills.

There are three ways to earn this graduate certificate:

#### Build Your Own

Students align their courses to their professional goals by choosing one area of focus or widening their scope and building expertise on all business fundamentals as they build their curriculum (<https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/build-your-own-curriculum/>). Students can select any graduate-level business courses offered that semester, provided they meet course prerequisites. Course offerings vary by term and campus.

#### Eight-month International Student Cohort Curriculum

Students take five courses as a part of an international student cohort ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/international-cohort/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=gcba](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/academics/international-cohort/?utm_medium=website&utm_source=catalog&utm_campaign=gcba)). Students expand their business knowledge in financial reporting, managerial decision-making, information analysis, and managing information resources.

#### Part-Time MBA Path Curriculum

Students take six foundational quantitative and business classes from the D'Amore-McKim MBA curriculum in the Part-Time MBA Path (<https://damore-mckim.northeastern.edu/programs/business-administration-certificate/academic-details/part-time-mba-path-curriculum/>).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Part-Time MBA Path Curriculum

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
ACCT 6201	Financial Reporting and Managerial Decision Making 2	1.5
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MGSC 6200	Information Analysis	3
MGSC 6204	Managing Information Resources	1.5

## Eight-Month International Student Cohort Curriculum

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	3
HRMG 6200	Managing People and Organizations	3
INNO 6200	Enterprise Growth and Innovation	3
INTB 6200	Managing the Global Enterprise	3
MKTG 6200	Creating and Sustaining Customer Markets	3

## Build-Your-Own Curriculum

Code	Title	Hours
In consultation with advisor, complete 12–15 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

## Accelerated Four-Month Curriculum

Code	Title	Hours
In consultation with advisor, complete 12–15 graduate-level semester hours for which prerequisites have been met. Choose from the following subject codes:		

ACCT, BUSN, ENTR, FINA, HRMG, INTB, MECN, MGMT, MKTG, SCHM, STRT, and TECE

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Business Administration, Graduate Certificate—Online

Northeastern University D'Amore-McKim School of Business' Online Graduate Certificate in Business Administration ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=gcba](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/business-administration/?utm_medium=website&utm_source=catalog&utm_campaign=gcba)) helps students gain forward-thinking, in-demand business skills. Students can align their interests with their goals by choosing one area of focus, or they may choose to widen their scope and build expertise on all business fundamentals.

Students select four classes from finance, marketing, sustainability, entrepreneurship, investments, management, healthcare, or supply chain management.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
In consultation with advisor, complete 12 graduate-level semester hours for which prerequisites have been met:		
ACCT 6272	Financial Statement Preparation and Analysis	12
ACCT 6273	Identifying Strategic Implications in Accounting Data	
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
ENTR 6216	Global Social Entrepreneurship and Innovation	
FINA 6200	Value Creation through Financial Decision Making	
FINA 6203	Investment Analysis	
FINA 6204	International Financial Management	
FINA 6205	Financial Strategy	

FINA 6211	Financial Risk Management
FINA 6213	Investment Banking
FINA 6214	Mergers and Acquisitions
FINA 6215	Business Turnarounds
FINA 6216	Valuation and Value Creation
FINA 6217	Real Estate Finance and Investment
HRMG 6200	Managing People and Organizations
HRMG 6217	Virtual, Vicious Teams: Building and Leading High-Performance Teams
INNO 6200	Enterprise Growth and Innovation
INTB 6200	Managing the Global Enterprise
INTB 6212	Cultural Aspects of International Business
MECN 6200	Global Competition and Market Dominance
MECN 6205	Sustainability and the Economics of Markets
MGMT 6222	Healthcare Industry
MGMT 6223	Strategic Decision Making for Healthcare Professionals
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment
MGSC 6200	Information Analysis
MGSC 6204	Managing Information Resources
MGSC 6221	Introduction to Health Informatics and Health Information Systems
MKTG 6200	Creating and Sustaining Customer Markets
MKTG 6210	Marketing Research
MKTG 6212	International Marketing
MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy
MKTG 6218	Managing Customer Engagement in a Service World
MKTG 6223	Brand and Advertising Management
SCHM 6201	Operations and Supply Chain Management
SCHM 6211	Logistics and Transportation Management
MKTG 6212	International Marketing
SCHM 6213	Global Supply Chain Strategy
SCHM 6214	Sourcing and Procurement
SCHM 6221	Sustainability and Supply Chain Management

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Business Analytics, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Business Analytics ([https://damore-mckim.northeastern.edu/programs/business-analytics-certificate/?utm\\_medium=content&utm\\_source=catalog&utm\\_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcba-con-2022\\_02\\_25-gcbanalytics\\_catalog](https://damore-mckim.northeastern.edu/programs/business-analytics-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcba-con-2022_02_25-gcbanalytics_catalog)) is designed to equip students to use data to analyze information, generate insights, and translate them into sound strategy. Students build expertise in up-to-the-moment methods for using analytics in business.

In just four courses—with the option to take a fifth to deepen their knowledge base—students view the business world through a data-centric lens. Depending on the courses they choose, students can explore topics such as advanced data mining techniques, visual dashboards, artificial intelligence, and programming languages.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Core Requirements**

Code	Title	Hours
MISM 6200	Introduction to Business Analytics	3

**Electives**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		9
MISM 6202	Foundations of Data Analysis for Business	
MISM 6205	Data Wrangling for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MISM 6213	Business Information Design, Quality, and Strategy	
SCHM 6215	Supply Chain Analytics	

**Program Credit/GPA Requirements**

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

**Business Management for Healthcare, Graduate Certificate**

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Business Management for Healthcare ([https://damore-mckim.northeastern.edu/programs/business-management-healthcare-certificate/?utm\\_source=internal-referral&utm\\_medium=nucatalog&utm\\_campaign=gcbmh](https://damore-mckim.northeastern.edu/programs/business-management-healthcare-certificate/?utm_source=internal-referral&utm_medium=nucatalog&utm_campaign=gcbmh)) helps students gain critical business knowledge, up-to-the-moment technical skills, and a core understanding of key healthcare issues.

In just four courses—with an option to take a fifth to deepen their learning—students study the fundamentals of the American healthcare system and identify its unique challenges and opportunities. Depending on the electives they choose, students can take a deeper look at health policy, health informatics, and supply chain management for healthcare.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Core Requirements**

Code	Title	Hours
HINF 5105	The American Healthcare System	3
HRMG 6220	Health Organization Management	3
STRT 6220	Strategic Management for Healthcare Organizations	3

**Electives**

Code	Title	Hours
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		3
HINF 5101	Introduction to Health Informatics and Health Information Systems	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
SCHM 6223	Managing Healthcare Supply Chain Operations	

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

## Corporate Finance, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Corporate Finance ([https://damore-mckim.northeastern.edu/programs/corporate-finance-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gccf](https://damore-mckim.northeastern.edu/programs/corporate-finance-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gccf)) helps students advance their finance careers by building cutting-edge business planning, financial analysis, and investment management skill sets.

In just four courses—with the option to take a fifth course to further their learning—students have an opportunity to develop a deeper understanding of domestic and international markets, building a rich context for effective financial decision making. Depending on their chosen electives, students can explore critical topics in greater depth such as investment banking, mergers and acquisitions, and business turnarounds.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Core Requirement

Code	Title	Hours
FINA 6205	Financial Strategy	3

### Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met (some courses may also apply to requirements of the MBA program):		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
FINA 6204	International Financial Management	
FINA 6213	Investment Banking	
FINA 6214	Mergers and Acquisitions	
FINA 6215	Business Turnarounds	
FINA 6216	Valuation and Value Creation	
FINA 6260	Entrepreneurial Finance and Venture Capital	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MECN 6200	Global Competition and Market Dominance	
MKTG 6200	Creating and Sustaining Customer Markets	
STRT 6200	Strategic Decision Making in a Changing Environment	

### Program Credit/GPA Requirements

12 semester hours required; may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

## Corporate Innovation, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Corporate Innovation ([https://damore-mckim.northeastern.edu/programs/corporate-innovation-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gcci](https://damore-mckim.northeastern.edu/programs/corporate-innovation-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcci)) prepares students with an agile, curious mindset and expertise in proven innovation practices.

In just four courses—with the option to take a fifth course to deepen their knowledge—students learn essential innovation tools for improving processes, products, and services, emphasizing driving growth through innovation. Depending on the electives chosen, students explore critical topics in greater depth, such as social enterprise, business model design, or corporate entrepreneurship.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirement

Code	Title	Hours
INNO 6200	Enterprise Growth and Innovation	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9
ENTR 6212	Business Planning for New Ventures	
ENTR 6300	Managing a Technology-Based Business	
ENTR 6340	The Technical Entrepreneur as Leader	
GE 5100	Product Development for Engineers	
INNO 6217	Lean Innovation	
INNO 6222	Competing in Dynamic, Innovation-Driven Markets	
INNO 6225	Acquisitions, Alliances, and Growth	
HRMG 6212	Creating an Innovative Organization	
HRMG 6280	The Human Side of Innovation	
MGMT 6280	Innovation for Next-Generation Products and Systems	
MKTG 6214	New Product Development	

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

## Corporate Renewal, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Corporate Renewal ([https://damore-mckim.northeastern.edu/programs/corporate-renewal-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gccr](https://damore-mckim.northeastern.edu/programs/corporate-renewal-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gccr)) is designed to prepare students with the skills and knowledge to reinvent troubled companies. Students develop an agile and strategic mindset—and a portfolio of skills from multiple disciplines.

In just four courses—with the option to take a fifth course to expand their learning—students have an opportunity to develop a deeper understanding of the management and financial issues companies face when they're in crisis and to build skills to facilitate the process of reinvention and restructuring. They study the essentials of guiding companies through workouts, bankruptcies, liquidations, and restructuring—and help them find success on the other side. Depending on their chosen electives, students explore critical topics in greater depth, such as strategic planning, innovation, and negotiation.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
FINA 6200	Value Creation through Financial Decision Making	3
HRMG 6200	Managing People and Organizations	3
MKTG 6200	Creating and Sustaining Customer Markets	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 3 graduate-level semester hours from the following for which prerequisites have been met:		
FINA 6216	Valuation and Value Creation	
HRMG 6212	Creating an Innovative Organization	
HRMG 6218	Great Companies	
HRMG 6223	Global Talent Management	
MGMT 6214	Negotiations	
MKTG 6214	New Product Development	
MKTG 6216	Market Focused Strategy	

## Program Credit/GPA Requirements

12 total semester hours required; may complete a maximum of 15 semester hours

Minimum 3.000 GPA required

## Entrepreneurship, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Entrepreneurship ([https://damore-mckim.northeastern.edu/programs/entrepreneurship-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gce](https://damore-mckim.northeastern.edu/programs/entrepreneurship-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gce)) is designed to help students learn how to launch a cutting-edge venture and develop a business plan for a high-potential idea. Students have an opportunity to build a strong foundation of business knowledge that includes product development, planning, and competitive strategies.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students study core business skills and essential best practices for commercializing innovation in a digital economy. Depending on their chosen electives, students explore critical topics in greater depth, such as disruptive technologies, lean design, or financing.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirement

Code	Title	Hours
INNO 6200	Enterprise Growth and Innovation	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6212	Business Planning for New Ventures	
ENTR 6214	Social Enterprise	
ENTR 6218	Business Model Design and Innovation	
ENTR 6219	Financing Ventures from Early Stage to Exit	
ENTR 6240	Emerging and Disruptive Technologies	
ENTR 6241	Entrepreneurial Marketing and Selling	

ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
FINA 6260	Entrepreneurial Finance and Venture Capital
GE 5030	Iterative Product Prototyping for Engineers

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### International Business, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in International Business ([https://damore-mckim.northeastern.edu/programs/international-business-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gcib](https://damore-mckim.northeastern.edu/programs/international-business-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcib)) helps students cultivate a global mindset and develop the cultural agility required to lead in an increasingly globalized business world.

In just four courses—with the option to take a fifth to deepen their knowledge base—students study international trade issues, legal and political considerations for decision making, international currency markets, and significant cultural and ethical issues. Depending on their chosen electives, students explore topics such as competing in emerging markets or issues affecting global supply chain design.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
INTB 6200	Managing the Global Enterprise	3
INTB 6212	Cultural Aspects of International Business	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		
FINA 6204	International Financial Management	
INNO 6200	Enterprise Growth and Innovation	
INTB 6226	Becoming a Global Leader	
INTB 6230	Global Field Study	
INTB 6249	Digitization of International Business	
MECN 6200	Global Competition and Market Dominance	
MKTG 6212	International Marketing	
SCHM 6213	Global Supply Chain Strategy	

## Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

### Investments, Graduate Certificate

Northeastern University D'Amore-McKim School of Business's Graduate Certificate in Investments ([https://damore-mckim.northeastern.edu/programs/investments-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gci](https://damore-mckim.northeastern.edu/programs/investments-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gci)) equips students with a deep understanding of global markets, financial best practices, and quantitative and analytical tools.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students study cutting-edge theories and quantitative tools for identifying, valuing, and analyzing investment choices. Depending on their chosen electives, students explore critical topics in greater depth, such as real estate investing, personal financial planning, risk management, and insurance.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Core Requirement

Code	Title	Hours
FINA 6203	Investment Analysis	3

### Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met. Some courses may also apply to requirements of the MBA program.		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6339	Quantitative Portfolio Management	
FINA 6360 or FINA 6361	Fund Management for Analysts (3 credits total) Fund Management for Managers	
HRMG 6200	Managing People and Organizations	
INTB 6200	Managing the Global Enterprise	
MECN 6200	Global Competition and Market Dominance	
MKTG 6200	Creating and Sustaining Customer Markets	
STRT 6200	Strategic Decision Making in a Changing Environment	

### Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

### Leading People and Organizations, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Leading People and Organizations ([https://damore-mckim.northeastern.edu/programs/leading-people-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gclpo](https://damore-mckim.northeastern.edu/programs/leading-people-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gclpo)) helps students develop cutting-edge skills for developing and leading successful teams.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students learn essential principles for building and leading high-performing and collaborative teams. Depending on the electives chosen, students explore critical topics in greater depth, such as health organization management, negotiating, or leading for environmental sustainability.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Core Requirement**

Code	Title	Hours
HRMG 6200	Managing People and Organizations	3

**Electives**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9

HRMG 6212	Creating an Innovative Organization
HRMG 6218	Great Companies
HRMG 6220	Health Organization Management
HRMG 6223	Global Talent Management
MGMT 6214	Negotiations
STRT 6210	Workforce Metrics and Analytics

**Program Credit/GPA Requirements**

12 semester hours required; may take a maximum of 15 semester hours  
Minimum 3.000 GPA required

**Marketing, Graduate Certificate**

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Marketing ([https://damore-mckim.northeastern.edu/programs/marketing-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gcm](https://damore-mckim.northeastern.edu/programs/marketing-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcm)) prepares students to leverage digital marketing tools to capitalize on trends and communicate powerfully with an audience.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students learn how technology transforms the ways companies engage their customers. They dive into topics such as social media, marketing research, consumer behavior, marketing analysis, planning and strategy, and innovation.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Core Requirement**

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3

**Electives**

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours from the following for which prerequisites have been met:		9

MKTG 6210	Marketing Research
MKTG 6212	International Marketing
MKTG 6214	New Product Development
MKTG 6216	Market Focused Strategy
MKTG 6218	Managing Customer Engagement in a Service World
MKTG 6222	Digital Marketing
MKTG 6223	Brand and Advertising Management
MKTG 6224	B2B and Strategic Sales
MKTG 6226	Consumer Behavior

MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit
MKTG 6234	Marketing Analytics

## Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours  
Minimum 3.000 GPA required

### Marketing Analytics, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Marketing Analytics ([https://damore-mckim.northeastern.edu/programs/marketing-analytics-certificate/?utm\\_source=internal-referral&utm\\_medium=nu-catalog&utm\\_campaign=gcma](https://damore-mckim.northeastern.edu/programs/marketing-analytics-certificate/?utm_source=internal-referral&utm_medium=nu-catalog&utm_campaign=gcma)) empowers students with the skills they need to turn data into smart marketing strategies.

In just four courses—with the option to take a fifth course to further their learning—students focus on the role of data and technology in a modern marketing strategy, from customer relationship management to performance measurement. They develop analytical, computational, and strategic thinking skills that will help them link the insights they generate to the marketing results they want.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
MKTG 6200	Creating and Sustaining Customer Markets	3
MKTG 6234	Marketing Analytics	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours from the following for which prerequisites have been met:		
MKTG 6210	Marketing Research	
MKTG 6216	Market Focused Strategy	
MKTG 6222	Digital Marketing	
MKTG 6230	Driving Marketing Performance: Measure, Analyze, Profit	

## Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours

Minimum 3.000 GPA required

### Mutual Fund Management, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Mutual Fund Management ([http://www.damore-mckim.northeastern.edu/academic-programs/certificates/mutual-fund-management/?utm\\_medium=website&utm\\_source=catalog&utm\\_campaign=gcmfm](http://www.damore-mckim.northeastern.edu/academic-programs/certificates/mutual-fund-management/?utm_medium=website&utm_source=catalog&utm_campaign=gcmfm)) helps students build the skills to become knowledgeable asset managers that create value by spotting opportunities and capitalizing on growth.

In just four courses—with the option to take a fifth course to deepen your knowledge base—students learn the essentials of managing funds, including allocating assets, managing risk, and complying with regulations. Depending on the electives chosen, students explore critical topics in greater depth, such as market analysis or fixed-income securities.

Students may enroll in our Graduate Certificate in Mutual Fund Management for part-time study.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		
FINA 6202	Analysis of Financial Institutions and Markets	9
FINA 6203	Investment Analysis	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6219	Portfolio Management	
FINA 6360	Fund Management for Analysts (Complete 3 semester hours through our student managed mutual fund. Each course is 1 semester hour and may be taken multiple times.)	

## Electives

Code	Title	Hours
In consultation with advisor, complete 3 graduate-level semester hours for which prerequisites have been met:		
FINA 6202	Analysis of Financial Institutions and Markets	3
FINA 6203	Investment Analysis	
FINA 6211	Financial Risk Management	
FINA 6212	Fixed-Income Securities and Risk	
FINA 6213	Investment Banking	
FINA 6217	Real Estate Finance and Investment	
FINA 6219	Portfolio Management	
FINA 6360	Fund Management for Analysts (Complete 3 semester hours through our student managed mutual fund. Each course is 1 semester hour and may be taken multiple times.)	

## Program Credit/GPA Requirements

12 total semester hours required; may take a maximum of 15 semester hours  
Minimum 3.000 GPA required

### Supply Chain Management, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Supply Chain Management ([https://damore-mckim.northeastern.edu/programs/supply-chain-management-certificate/?utm\\_source=internal-referral&utm\\_medium=nucatalog&utm\\_campaign=gcscm](https://damore-mckim.northeastern.edu/programs/supply-chain-management-certificate/?utm_source=internal-referral&utm_medium=nucatalog&utm_campaign=gcscm)) helps students become skilled supply chain leaders who can respond to disruption with agility and confidence.

In just four courses—with the option to take a fifth course to deepen their knowledge base—students build a strong portfolio of skills for optimizing supply chains from end to end, advancing their knowledge of sourcing, logistics, inventory management, and process control. They also have the opportunity to explore elective topics important to their professional goals, such as creating and managing sustainable supply chains.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
SCHM 6201	Operations and Supply Chain Management	3
SCHM 6213	Global Supply Chain Strategy	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 6 graduate-level semester hours for which prerequisites have been met:		
SCHM 6211	Logistics and Transportation Management	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	
SCHM 6224	Demand Planning and Forecasting	

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Sustainability and Business, Graduate Certificate

Northeastern University D'Amore-McKim School of Business' Graduate Certificate in Sustainability and Business ([https://damore-mckim.northeastern.edu/programs/sustainability-business-certificate/?utm\\_medium=content&utm\\_source=catalog&utm\\_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcsb-con-2022\\_02\\_25-gcsb\\_catalog](https://damore-mckim.northeastern.edu/programs/sustainability-business-certificate/?utm_medium=content&utm_source=catalog&utm_campaign=dmsb-melt-evg-glo-comp-bos-bus-gcsb-con-2022_02_25-gcsb_catalog)) helps students build the skills to increase efficiency, drive value, and build trust through sustainable practices.

In just four courses—with the option to take a fifth course to expand their learning—students learn to implement sustainable business strategies to create a competitive edge for organizations. Depending on the electives chosen, students may dive into social entrepreneurship, public policy, and sustainable supply chain management.

Students may enroll in our Graduate Certificate in Sustainability and Business for part-time study.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Core Requirement

Code	Title	Hours
MECN 6200	Global Competition and Market Dominance	3

## Electives

Code	Title	Hours
In consultation with advisor, complete 9 graduate-level semester hours for which prerequisites have been met:		
ENTR 6214	Social Enterprise	
ENTR 6216	Global Social Entrepreneurship and Innovation	
MECN 6205	Sustainability and the Economics of Markets	
MGMT 6225	Sustainability and Leadership	
MGMT 6226	Sustainability and the Business Environment	
SCHM 6221	Sustainability and Supply Chain Management	

## Program Credit/GPA Requirements

A total of 12 semester hours is required

Minimum 3.000 GPA required

## Khoury College of Computer Sciences

Website (<https://khoury.northeastern.edu>)

**Elizabeth Mynatt, PhD**, Dean

**Ben Hescott, PhD**, Teaching Professor, Senior Associate Dean of Academic Programs and Student Experience

**Amit Shesh, PhD**, Assistant Dean of Master's Programs

**Byron Wallace PhD**, Associate Dean for Graduate Programs

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At the Khoury College of Computer Sciences, we are inspired by our information-driven world and strive to make it a better place. Our students engage in rigorous learning and real-world co-op experiences. Our renowned faculty shapes minds, sparks innovation, and inspires ideas. Our interdisciplinary research breaks new ground to solve everyday problems.

Khoury maintains a strong research program with significant funding from the major federal research agencies and private industry. With a substantial increase in faculty strength and research funding in recent years, we are actively seeking highly motivated, bright, hardworking students who are interested in pursuing a PhD degree in computer science or in the interdisciplinary field of cybersecurity, network science, or personal health informatics. Graduate students and faculty members are involved in exciting projects in a wide range of research areas, including programming languages, software engineering, distributed and parallel computing, cryptography, network security, health informatics, network science, databases, information retrieval, robotics, visualization, and artificial intelligence. Colloquia and weekly research seminars contribute to the vibrant research atmosphere in the college.

Our curriculum encompasses both the breadth and depth needed for graduate school. Specialized, advanced courses for PhD students in computer science, cybersecurity, and personal health informatics are designed to prepare all students for research early in their doctoral education.

The Master of Science in Computer Science curriculum combines the study of basic algorithms and theoretical computer science principles with advanced programming and software design methods. It offers students the opportunity to develop the analytical and problem-solving skills needed to pursue challenging professional careers.

Khoury also offers the Master of Science in Artificial Intelligence, which provides a comprehensive framework of theory and practice in this emerging field and incorporates elements of data science, robotics, and machine learning; and the Master of Science in Cybersecurity focuses on information technology and incorporates the understanding of the social sciences, law, criminology, and management needed to prevent and combat cyberattacks.

In addition, we offer four interdisciplinary master's degree programs: the Master of Science in Health Informatics with Bouvé College of Health Sciences, which seeks to prepare graduates to use information technology to improve healthcare delivery and outcomes; the Master of Science in Data Science with the College of Engineering, which is designed to give students a comprehensive framework for processing, modeling, analyzing, and reasoning about data; the Master of Science in Robotics with the College of Engineering, which offers students an opportunity to obtain a comprehensive understanding of the algorithms, sensors, control systems, and mechanisms used in robotics; and the Master of Science in Game Science and Design with the College of Arts, Media and Design, which seeks to provide students with a comprehensive understanding of how successful game products are created in a player-centric environment.

The Align program enables intellectually curious students to earn a Master of Science in Computer Science or Data Science without a background in the field. Regardless of undergraduate major or prior programming experience, Align's custom curricula is designed to prepare students for high-demand industries.

Khoury College is a tightly knit community, and the faculty, staff, and students interact regularly through town hall meetings, social gatherings, lectures, and seminars. A diverse, multicultural graduate student body and faculty encourage rich extracurricular interaction. The Master's Council organizes a number of social events to promote friendship and camaraderie within the Khoury community.

## Academic Policies and Procedures

- Academic Probation and Dismissal (p. 333)
- Attendance Policy (p. 333)
- Campus Transfer (p. 334)
- Certificates (p. 335)
- Incomplete Grades (p. 335)

- Pass / Fail Policy (p. 335)
- Reentry to Program (p. 335)
- Retaking Courses (p. 335)
- Transfer of Credit (p. 336)

## Academic Probation and Dismissal

### Academic Integrity Violation Submission and Review Process

#### ACADEMIC INTEGRITY POLICY

A faculty member who suspects that a graduate student has violated the university's Academic Integrity Policy (p. 155) must offer to meet with the student to discuss the suspected violation. The faculty member may ask the student to provide supporting documentation and may gather information from other students involved in the incident.

If the faculty member finds that the student has violated the Academic Integrity Policy, the faculty member may take appropriate action and can include adjusting the student's grade, requiring additional academic work, and/or submitting a failing grade for the student's qualifying examination. The faculty member is encouraged to submit an incident report to the Office of Student Conduct and Conflict Resolution and forward the report to the director for graduate administration at Khoury College of Computer Sciences, which handles suspected violations of the Academic Integrity Policy. Any penalties must be imposed by the faculty member within three weeks of learning of the suspected violation.

The Academic Integrity Committee regularly reviews all reports and appeals. Students will be notified of the decision made by the Academic Integrity Committee within two weeks.

Students found in violation of the Academic Integrity Policy will be placed on deferred suspension. A deferred suspension is a formal warning for a violation and remains with the student for their entire time in the program. Based on the severity of the violation, the Academic Integrity Committee may recommend one or more of the following sanctions:

- Removal of co-op privilege for the remainder of time in the MS program
- Suspension or deferral of co-op for one or two semesters
- Disqualification from paid graduate student positions within the college (i.e., graders, course assistants, TA/RA appointments)

Students deemed to be in violation of the Academic Integrity Policy for a second instance may be terminated from their graduate program.

In accordance with university policy, the college maintains the right to override decisions issued by the Office of Student Conduct and Conflict Resolution in academic performance.

Students will have the right to appeal all decisions issued by the Master's Academic Integrity Committee. The appeals process is outlined below.

#### APPEALS PROCESS

Students are entitled to appeal all decisions made by the college's Academic Integrity Appeals Committee. The appeals committee is comprised of a graduate co-op faculty member, the senior director of graduate student services, and one Khoury faculty member. Cases submitted concerning students from interdisciplinary programs will be reviewed by an appeals committee that includes a member of college administration at the assistant dean, associate dean, or faculty level. Student appeals will be heard by the committee and then by the college senior associate dean. In the event the appeal is denied at both college levels, the student will have the right to have their appeal heard by the university's Academic Appeals Resolution Committee. College-level appeals will be heard monthly, in accordance with the Academic Integrity Committee meeting schedule.

Details regarding the university academic appeals process can be found in the graduate catalog (p. 185).

## Attendance Policy

Students are expected to attend all classes and lab sections for their registered courses. Any student who anticipates missing a class due to illness or emergency situations is expected to contact their professor as soon as possible.

The Khoury College of Computer Sciences expects students who are eligible to travel over winter and summer breaks to return to campus on time and to be present for the first week of classes each term. Students who do not arrive back to campus on time may be dropped from their classes. The Office of the University Registrar posts current and future academic calendars (<https://registrar.northeastern.edu/group/calendar/>) on their website so travel plans can be made accordingly.

For more information on Northeastern University's attendance requirements, please visit here (<https://catalog.northeastern.edu/graduate/academic-policies-procedures/attendance-requirements/>).

## Campus Transfer

Khoury College graduate students may request an intercampus transfer after at least one academic year (two full-time semesters) in their graduate program if their academic program is offered at the target campus. For campus transfers, the eligible full-time semesters are fall, spring, and full summer. For Align programs, students must have completed their Align Bridge coursework.

### **Transfer Eligibility Requirements (excepting MSCS Computer Science—Align online students (p. 334))**

1. Student has met with their current academic advisor to discuss transfer option.
2. Minimum of 3.000 overall grade-point average.
3. Completed two full-time academic semesters on their original campus. (*Note:* incoming students should work with the Office of Admissions to request a campus change.)
4. All Align students: successful completion of bridge courses at home campus.
5. Student is relocating for a work experience and wants to complete their academic program at the new location and can provide documentation.
6. Transfers to the Boston campus will be considered for approval if a student has secured a research assistantship opportunity and can provide documentation from their sponsoring faculty.
7. Other unique circumstances must be approved by the senior director for graduate student services.

If a student is found to misrepresent their circumstances in the intercampus transfer process, they will be referred to Khoury College's Academic Integrity Committee.

### **IMPORTANT CONSIDERATIONS FOR ALL MS STUDENTS**

- Intercampus transfer requests are not guaranteed approval and may be denied based on capacity at their target campus. Transfers are approved or denied by Khoury's senior director for graduate student services or associate dean for graduate network.
- Students should consider living, housing, and moving expenses when considering an intercampus transfer.
- Students who cancel an approved transfer to a specific campus in a specific term will need to work with their advisor to resubmit a new transfer request if their plans change. Prior approval does not guarantee approval of a new request.
- Students considering transfer to the Vancouver campus should review Canadian study permit and co-op/internship policies here (<https://nam12.safelinks.protection.outlook.com/?url=https%3A%2F%2Finternational.northeastern.edu%2Fogs%2Fstudent-support%2Fglobal-campuses%2Fcanada%2F&data=05%7C02%7CCatalog%40northeastern.edu%7Cc4c7b4fbe96a4d4c1f6908dc99f913b3%7Ca8eec281aaa34daeac9b9a398b9215e7%7C0%7C0%7C638554542284808289%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzliLCJBiTil6Ik1haWwiLCJXVCi6Mn0%3D%7C0%7C%7C%7C&sdata=7kRWDF8hUthvljw%2F2gtTU6NiiTFIkFvD87MLZoyM3TE%3D&reserved=0>) before making their decisions. Canada's post-graduation work permit (PGWP) has specific restrictions around the length of a program that must be completed in Canada. Students who transfer to the Vancouver campus with remaining length of their degree program of less than eight months are not eligible for the PGWP.
- Students graduating from Canadian campuses must complete a capstone course prior to graduation.
- Vancouver students considering transfer to a U.S. campus should review immigration/visa information (<https://international.northeastern.edu/ogs/new-students/>) and co-op/internship policies (<https://international.northeastern.edu/ogs/employment/off-campus-employment/>) before making their decision.

### **DEADLINES FOR TRANSFER (EXCLUDING VANCOUVER)**

- Transfer for fall term: two weeks prior to fall registration date
- Transfer for spring term: two weeks prior to spring registration date
- Transfer for summer term: two weeks prior to summer registration date

### **DEADLINES FOR TRANSFER TO VANCOUVER\***

- Transfer for fall term: 90 days prior to fall registration date as determined
- Transfer for spring term: 90 days prior to spring registration date
- Transfer for summer term: 90 days prior to summer registration date

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### **MSCS COMPUTER SCIENCE—ALIGN ONLINE STUDENT INTERCAMPUS TRANSFER POLICY**

Students enrolled in the MSCS Computer Science—Align (p. 369) program (with catalog term fall 2023 onward) for fully online course delivery are eligible to transfer to an on-ground campus of their choosing at specific points in their program:

- MSCS Computer Science—Align (p. 369) online students in good standing can transfer to an on-ground campus after they successfully complete the Align Bridge coursework: Intensive Foundations of Computer Science (CS 5001), Discrete Structures (CS 5002), Object-Oriented Design (CS 5004), and Data Structures, Algorithms, and Their Applications within Computer Systems (CS 5008). A student who instead seeks to transfer after successful completion of two semesters of degree coursework should contact their advisor to explore general transfer eligibility requirements.

MSCS Computer Science—Align (p. 369) online students must be in good academic standing (minimum 3.000 overall GPA) and meet with their academic advisor to begin the transfer process.

\* \*Transfer to Vancouver requires more time due to study permit process.

## Certificates

Khoury College of Computer Sciences offers numerous graduate certificates. These certificates may be completed as stand-alone credentials or in combination with a graduate degree. The graduate certificates offer the opportunity for working professionals or graduate students to broaden their skills and knowledge or stay competitive in the job market. Graduate coursework may be completed as part of a certificate program and applied toward a graduate degree in Khoury College.

## Incomplete Grades

Students who are considering an incomplete (I) grade for a course must read the Requesting and Clearing An Incomplete Grade (p. 179).

After completing the Incomplete Grade Contract ([https://service.northeastern.edu/registrar/?sys\\_kb\\_id=edf6960747a44a50c1c8874c346d43c4&id=kb\\_article\\_view&sysparm\\_rank=2&sysparm\\_tsqueryId=7cf56f01474b8650c1c8874c346d4364](https://service.northeastern.edu/registrar/?sys_kb_id=edf6960747a44a50c1c8874c346d43c4&id=kb_article_view&sysparm_rank=2&sysparm_tsqueryId=7cf56f01474b8650c1c8874c346d4364)) with instructor's approval and signature, the student must send a copy to their academic advisor for record keeping.

## Pass / Fail Policy

### Pass/Fail Policy

Khoury College does not allow Khoury graduate students to elect a pass/fail grading scheme for courses that are letter graded.

## Reentry to Program

A student not registered for a course in their program of study for three consecutive semesters will be marked inactive and withdrawn from the program. A student who has been withdrawn must reapply to their program of study.

A student may be dismissed due to an academic integrity violation, student conduct, or for making insufficient academic progress. While a student who has been dismissed can reapply for admission, their application is not likely to be considered favorable without sufficient evidence toward future student success.

A student on an official leave may return without reapplying if they return within one year from the start of their leave. A student who is on any leave for more than one year is officially withdrawn from their program and must reapply.

Readmitted students must follow the course catalog and program requirements of the academic year of readmission.

If the program is no longer offered, students must apply to a new program and meet the conditions of admission to the new program. Courses from the previous program are not guaranteed to transfer to the new program.

If readmitted, any course, course waivers, or transfer credits that a student was previously awarded will be reevaluated. There is a seven-year time limit on course transfers; any earned credit older than seven years is unlikely to transfer.

## Retaking Courses

When the appropriate course is available, students may retake a nonrepeatable course up to two times to earn a better grade and must be approved by the students' academic advisor. In all cases, the most recent grade earned in a course is the one used in calculating the overall grade-point average followed by the retake notation I, indicating the course grade is included in the overall GPA; however, previous grades remain on the transcript followed by the retake notation E, signifying that that course grade has been excluded. Consult your academic advisor before retaking a course. Students are required to pay normal tuition for all retaken coursework.

When the course description for the student's registration term indicates that the course may be repeated up to a certain number of course completions, each completion of the course (up to the limit stated in the course description) will appear on the student's transcript, and the grade for each such completion will be used in the calculation of the student's overall GPA.

## Transfer of Credit

A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the degree, provided the credits meet the following criteria:

- Work is completed at the graduate level for graduate credit
- Student received a grade of 3.000 or better
- Credits were earned at an accredited institution
- Credits have not been used toward any other degree
- Credits must not be more than seven years old at the time of transfer

Transfer credit will be offered only for courses that are equivalent to a course offered at Northeastern University and that have been approved by the graduate committee.

Students can submit a request for transfer of credit after they have begun taking courses in the Khoury College of Computer Sciences. Students are advised to contact their academic advisor to submit a request.

## Computer Science

At the Khoury College of Computer Sciences, we are inspired by an increasingly interconnected society, informed by a rapidly changing job market, and focused on addressing the challenges of a complex world. Our goal is to equip students with knowledge as diverse as it is deep. Our programs provide a strong technical foundation and an essential understanding of computing concepts while integrating computer and data sciences across disciplines and industries.

Our master's degrees are advanced programs that are designed to prepare students to be job ready through a rigorous curriculum, innovative research, experiential learning, and a collaborative environment rich in faculty expertise.

Our research-driven doctoral programs offer students an opportunity to engage in exciting projects, a vibrant community, and a challenging curriculum that offers breadth and depth in areas both within computer science and across disciplines throughout Northeastern University.

Graduate education in computer science also features the top-ranked Northeastern co-op program, enabling students to supplement their classroom education with real-world experience in the field.

### Doctor of Philosophy in Computer Science

The PhD program in computer science is designed to prepare students for careers in academia and industry—from conducting research to developing systems to publishing and presenting papers. The rigorous curriculum provides a broad background in the fundamentals of computer science and advanced courses in a wide range of focus areas.

The past decade has witnessed a dramatic increase in Northeastern's international reputation for research and innovative educational programs. Since 2014, the Khoury College of Computer Sciences has hired 71 outstanding faculty members and plans to continue this strategic growth in the coming years, advancing its position (<http://csrankings.org/>) among the nation's top research universities. Today, the college has a diverse faculty (<https://www.ccis.northeastern.edu/role/tenured-and-tenure-track-faculty/>) of 103 working in a wide range of research areas (<https://www.ccis.northeastern.edu/research/research-areas/>). Forty-one faculty members have joint appointments with other colleges and schools including engineering, science, business, social sciences and humanities, health sciences, law and arts, and media and design.

### Master of Science in Artificial Intelligence

The Master of Science program in artificial intelligence is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses selected from colleges throughout campus to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

### Master of Science in Data Science

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science program in data science. This program is designed to give students a comprehensive framework for reasoning about data. Students will engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students will also be able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Students in the MS program in data science will complete a capstone course, working with real-world data and applying what they have learned during the program. Successful program graduates will be well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

## Align Master of Science in Data Science

Students in the Align MS-DS program come from a variety of backgrounds, where they merge their existing knowledge with data science skills. Students will learn theoretical foundations and gain extensive experience with practical problems in the discipline including data acquisition, storage, analysis, probabilistic modeling, model deployment, and presentation.

## Master of Science in Robotics

The Master of Science in Robotics program, offered jointly by the College of Engineering and the Khoury College of Computer Sciences at Northeastern, looks at this fundamentally interdisciplinary field from three connected angles: mechanical engineering, electrical engineering, and computer science.

Through a technically challenging curriculum, hands-on learning, and industry co-op placements, students have an opportunity to gain a comprehensive understanding of the algorithms, control systems, and mechanisms used in robotics to help them stand out in the field and make a transformative impact on society.

For more information on the program, please visit the College of Engineering program page here (p. 488).

## Master of Science in Computer Science

Northeastern's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling students to increase their broad-based knowledge in the field while focusing on one curricular concentration selected from a range of options including artificial intelligence, computer-human interaction, graphics, programming languages, software engineering, data science, networks, theory, game design, systems, and information security.

## Align Master of Science in Computer Science

MSCS-Align students come from a wide variety of backgrounds—with undergraduate majors ranging from math, biology, history, engineering, and classics. In this program, students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

MSCS-Align Online—Take online courses from anywhere, with the flexibility to complete the courses fully online or transfer to one of our strategically located campuses after you've completed the bridge portion of the program. Align Online students will also have three in-person campus visits during the first two semesters to form peer and professional connections. The MSCS-Align Online option is not an F-1 compliant program.

## Graduate Certificate in Cloud Software Development

The Graduate Certificate in Cloud Software Development provides students of all backgrounds with the foundational skills needed to pursue a career in cloud computing. Through a four-course program that emphasizes hands-on, industry-facing experiential learning—via Khoury College's partnerships with leading cloud platform companies like AWS, Google, and Microsoft—you'll gain the technical ability, exposure, and experience to work on any cloud computing platform, as well as the career-building resources to put you on the fast track in this growing field.

## Graduate Certificate in Computer Science

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement as well as to those looking to move into graduate programs within the discipline.

The Graduate Certificate in Computer Science will serve as the foundational premaster's courses in the Align program.

## Graduate Certificate in Data Analytics

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

## Graduate Certificate in Inclusive Computer Science Education

The Graduate Certificate in Inclusive Computer Science Education is designed to prepare students to teach computer science principles and concepts in the context of a K-12 environment. Building on the successful Computer Science—Align program, this certificate assumes no prior computer science experience. Through coursework and project-based learning, students have an opportunity to obtain the foundational knowledge necessary to teach basic computing concepts and programming at a variety of educational levels both as stand-alone courses and integrated into other disciplines. The certificate emphasizes how teachers can create an inclusive classroom environment, actively work to dispel stereotypes, and build student confidence. Students who finish this certificate will be well positioned to obtain K-12 certification in computer science.

## Programs

### Doctor of Philosophy (PhD)

- Computer Science (p. 338)
- Network Science (p. 344)

### Master of Science (MS)

- Artificial Intelligence (p. 348)
- Complex Network Analysis (p. 349)
- Data Science (p. 351)
- Data Science—Align (p. 353)
- Game Science and Design (p. 226)
- Internet of Things (p. 358)
- Robotics (p. 361)
- Statistics (p. 364)
- Statistics (p. 366)—Connect

### Master of Science in Computer Science (MSCS)

- Computer Science (p. 368)
- Computer Science—Align (p. 369)

### Graduate Certificate

- Cloud Software Development (p. 371)
- Computer Science (p. 372)
- Data Analytics (p. 372)
- Inclusive Computer Science Education (p. 373)

## Computer Science, PhD

The PhD in Computer Science is designed to prepare students for careers in academia, industrial and national research labs, and technical leadership in industry and government. The rigorous curriculum provides a broad background in the fundamentals of computer science, advanced courses in a wide range of focus areas, and opportunity to make an impact at the forefront of computing. The program provides training in conducting research, publishing and presenting papers, developing systems, and establishing science and technology policy.

### Coursework

A minimum of 48 semester hours of coursework beyond the BS/BA degree is required of all students.

All students must demonstrate sufficient knowledge in the fundamentals of computer science, as well as the ability to carry out research in an area of computer science.

The student must maintain a minimum grade-point average of 3.500 among the six core courses and receive a grade of B or better in each of these courses. Students who have taken equivalent courses in other institutions may petition to be exempted from the course(s) (subject to the approval of the PhD computer science curriculum committee). Each student may repeat a course once for no more than three out of the six courses if they do not receive a B or better in the course. Students with a Master of Science in Computer Science may petition to the PhD computer science curriculum committee for an exemption from these courses. Petition forms are available on the college website.

The fields listed do not necessarily represent areas of specialization or separate tracks within the PhD program. Rather, they attempt to delineate areas on which the student must be examined in order to measure their ability to complete the degree. Therefore, they may be adjusted in the future to reflect changes in the discipline of computer science and in faculty interests within the Khoury College of Computer Sciences. Similarly, these fields do not represent the only areas in which a student may write their dissertation. They are, however, intended to serve as a basis for performing fundamental research in computer science.

### Paper Requirement

To demonstrate research ability, the student is required to submit to the PhD committee a research or a survey paper in an area of specialty under the supervision of a faculty advisor. A submitted paper from a student is considered to have fulfilled the paper requirement if:

1. The paper has been accepted by a selective conference.
2. The student has made a substantial contribution to the paper.
3. The advisor has endorsed the paper with a written statement indicating the student's contribution.
4. The PhD computer science curriculum committee has voted on a positive recommendation. The committee may require a presentation from the student before making a recommendation.

## Admission to Candidacy

Upon completion of the course and the research paper requirements, the student is admitted to candidacy for the PhD degree. It is highly recommended that the student complete the candidacy requirement by the end of their second year but no later than the third year.

## Residency

One year of continuous full-time study is required after admission to the PhD candidacy. It is expected that during this period the student will make substantial progress in preparing for the comprehensive examination.

## Teaching Requirement

All computer science PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

## Comprehensive Examination/Dissertation Proposal

After the student has achieved sufficient depth in a field of study, they prepare a proposal for the PhD dissertation. This process should take place no later than the end of the fifth year in residence. The student prepares a dissertation proposal, which describes the proposed research, including the relevant background materials from the literature. The proposal should clearly specify the research problems to be attacked, the techniques to be used, and a schedule of milestones toward completion.

The dissertation proposal must be approved by the dissertation committee. With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer science curriculum committee. The four members must include the advisor, two internal members, and an external member.

Upon approval of the written proposal, the student has to present the proposed work orally in a public forum, followed by a closed-door oral examination from the dissertation committee. The student may take the dissertation proposal examination twice, at most.

## Doctoral Dissertation

Upon successful completion of solving the research proposed in the dissertation proposal, the candidate has an opportunity to prepare the dissertation for approval by the dissertation committee. The dissertation must contain results of extensive research and make an original contribution to the field of computer science. The work should give evidence of the candidate's ability to carry out independent research. It is expected that the dissertation should be of sufficient quality to merit publication in a reputable journal in computer science.

## Doctoral Committee

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD computer science curriculum committee. The four members must include the advisor, two internal members, and an external member.

## Dissertation Defense

The dissertation defense is held in accordance with the regulations of the University Graduate Curriculum Committee. It consists of a lecture given by the candidate on the subject matter of the dissertation. This is followed by questions from the dissertation committee and others in attendance concerning the results of the dissertation as well as any related matters. The defense is chaired by the PhD advisor.

## Time and Time Limitation

After the establishment of degree candidacy, a maximum of five years will be allowed for the completion of the degree requirements, unless an extension is granted by the college graduate committee.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Coursework

Paper requirement  
 Admission to candidacy  
 Residency  
 Teaching requirement  
 Comprehensive examination/dissertation proposal  
 Doctoral dissertation  
 Doctoral committee  
 Dissertation defense

## Course Area Requirements

A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

Students should refer to the course numbering table for graduate course leveling (p. 176).

Code	Title	Hours
Complete a total of six courses. Courses must cover at least four of the five areas, and a maximum of two courses may be at the 5000 level.		
At least two courses must be 7000-level seminar courses.		
At least two courses must be 7000-level nonseminar courses.		
<b>Artificial Intelligence and Data Science</b>		
<i>Seminar Courses</i>		
CS 7170	Seminar in Artificial Intelligence	
<i>Nonseminar Courses</i>		
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	
CS 7240	Principles of Scalable Data Management: Theory, Algorithms, and Database Systems	
CS 7280	Special Topics in Database Management	
CS 7290	Special Topics in Data Science	
CS 7380	Special Topics in Graphics/Image Processing	
<i>Other Courses</i>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5335	Robotic Science and Systems	
CS 5850	Building Game Engines	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6240	Large-Scale Parallel Data Processing	
DS 5110	Introduction to Data Management and Processing	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
<b>Human-Computer Interaction</b>		
<i>Seminar Courses</i>		
CS 7375	Seminar in Human-Computer Interaction	
<i>Nonseminar Courses</i>		
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	

CS 7300	Empirical Research Methods for Human Computer Interaction
CS 7340	Theory and Methods in Human Computer Interaction
CS 7390	Special Topics in Human-Centered Computing
<i>Other Courses</i>	
CS 5097	Mixed Reality
CS 5170	Artificial Intelligence for Human-Computer Interaction
CS 5340	Computer/Human Interaction
CS 6350	Empirical Research Methods
<b>Software</b>	
<i>Seminar Courses</i>	
CS 7470	Seminar in Programming Languages
CS 7575	Seminar in Software Engineering
<i>Nonseminar Courses</i>	
CS 7430	Formal Specification, Verification, and Synthesis
CS 7480	Special Topics in Programming Language
CS 7485	Special Topics in Formal Methods
CS 7580	Special Topics in Software Engineering
<i>Other Courses</i>	
CS 5310	Computer Graphics
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5520	Mobile Application Development
CS 5610	Web Development
CS 6410	Compilers
CS 6510	Advanced Software Development
<b>Systems and Security</b>	
<i>Seminar Courses</i>	
CS 7270	Seminar in Database Systems
CS 7670	Seminar in Computer Systems
CS 7770	Seminar in Computer Networks
CS 7775	Seminar in Computer Security
<i>Nonseminar Courses</i>	
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CS 7680	Special Topics in Computer Systems
CY 7790	Special Topics in Security and Privacy
<i>Other Courses</i>	
CS 5600	Computer Systems
CS 5700	Fundamentals of Computer Networking
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 6710	Wireless Network
CS 6760	Privacy, Security, and Usability
CY 5130	Computer System Security
CY 5150	Network Security Practices
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
<b>Theory</b>	
<i>Seminar Courses</i>	
CS 7870	Seminar in Theoretical Computer Science
<i>NonSeminar Courses</i>	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography

CS 7840	Foundations and Applications of Information Theory
CS 7880	Special Topics in Theoretical Computer Science
<b>Other Courses</b>	
CS 5800	Algorithms
CY 5120	Applied Cryptography

## Electives

Code	Title	Hours
Complete 24 semester hours in the following:		24
Note: Consult faculty advisor for the other acceptable courses.		
CS 5100 to CS 5850, except CS 5340		
CS 6110 to CS 6810		
CS 7340	Theory and Methods in Human Computer Interaction	
CS 7930	Effective Scientific Writing in Computer Science	
CS 8982	Readings	

## Dissertation

Code	Title	Hours
Upon achieving PhD candidacy, complete the following courses for two consecutive semesters:		
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	
For remaining semester(s), complete the following (repeatable) course until graduation:		
CS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

48 total semester hours required  
Minimum overall 3.000 GPA required

## Plan of Study

### Sample Plan of Study

Year 1			
Fall	Hours	Spring	Hours
Area course		4 Area course	4
Readings		4 Readings	4
			8
			8
Year 2			
Fall	Hours	Spring	Hours
Area course		4 Area course	4
Readings		4 Readings	4
			8
			8
Year 3			
Fall	Hours	Spring	Hours
Area course		4 Area course	4
Readings		4 Readings	4
			8
			8
Year 4			
Fall	Hours	Spring	Hours
CS 9990		0 CS 9991	0
			0
Year 5			
Fall	Hours	Spring	Hours
CS 9996		CS 9996	0
			0

<b>Year 6</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
CS 9996		CS 9996	
	0		0

**Total Hours: 48**

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Coursework

Incoming PhD in Computer Science students who have already completed a Master of Science in Computer Science or an adjacent field may petition to the PhD in Computer Science program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced standing does not waive by itself any part of the PhD coursework requirements.

As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

## Paper Requirement

Refer to the Computer Science, PhD, overview (p. 338), for research/survey paper requirements.

## Admission to Candidacy

Refer to the Computer Science, PhD, overview, (p. 338) for admission to candidacy requirements.

## Residency

Refer to the Computer Science, PhD, overview, (p. 338) for residency requirements.

## Teaching Requirement

Refer to the Computer Science, PhD, overview, (p. 338) for the teaching requirement.

## Comprehensive Examination/Dissertation Proposal

Refer to the Computer Science, PhD, overview, (p. 338) for comprehensive examination requirements.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Course requirements  
Paper requirement  
Comprehensive exam  
Teaching requirement  
Doctoral candidacy  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each course.

<b>Code</b>	<b>Title</b>	<b>Hours</b>
Consult your faculty advisor for acceptable courses.		16

## Dissertation

Code	Title	Hours
Upon achieving PhD candidacy, complete the following courses for two consecutive semesters:		
CS 9990	Dissertation Term 1	
CS 9991	Dissertation Term 2	
For remaining semester(s), complete the following (repeatable) course until graduation:		
CS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum overall 3.500 GPA required

### Network Science, PhD

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing various fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This doctoral program trains students in network science across several colleges—the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. See other collaborating colleges' catalog sections for possible elective courses.

Coursework depends on a student's area of research and is subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 semester hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

## Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of the program's first and second years. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

Each student will have a primary dissertation advisor from the network science doctoral program faculty. The dissertation advisor should be selected by the end of the program's second year's spring semester.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty.

## Alternate Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is mandatory for students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

## Qualifying Examination

The qualification exam is an oral examination of the material covered in the core curriculum. The exam will be an hour long and consist of questions selected by network science faculty. Students will receive between 50 to 80 questions to review for one month before the exam—a subset of which will make up the exam.

All students are required to sit for the exam in the fall, typically in their third year of the PhD program. Students who fail to pass the qualifying exam on their first attempt are expected to retake it in the spring term.

Students following the alternate path may take the exam at the end of the first academic year, upon completion of the required core courses.

Students may only take the qualifying exam twice.

## Dissertation Proposal

Students must submit a written dissertation proposal to the dissertation committee. The proposal should identify relevant literature, the research problem, plan, and the potential impact on the field. The proposal will be presented in an open forum before a public audience and the dissertation committee, followed by questions from noncommittee members. The written proposal must be given to committee members at least two weeks before the oral presentation. After the presentation, the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation. The comprehensive exam must precede the final dissertation defense by at least one year.

Students may repeat the comprehensive examination once if they are unsuccessful.

## Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## Dissertation Defense

A PhD student must complete and defend a dissertation involving original network science research. The dissertation defense must adhere to the dissertation policies of the College of Social Science and Humanities (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>).

*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.*

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying exam  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

## Specializations

Complete 20 additional semester hours in one of the following specializations or another course of study with written approval from your advisor.

- Computer Science (p. 345)
- Epidemiology (p. 346)
- Math (p. 346)
- Physics/Theory (p. 346)
- Social Science (p. 346)
- Independent (p. 346)

### COMPUTER SCIENCE SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140 or CS 6220	Machine Learning Data Mining Techniques	4

**EPIDEMIOLOGY SPECIALIZATION**

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

**MATH SPECIALIZATION**

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4

**PHYSICS/THEORY SPECIALIZATION**

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7321	Computational Physics	4

**SOCIAL SCIENCE SPECIALIZATION**

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4

**INDEPENDENT SPECIALIZATION**

Code	Title	Hours
Students must choose two courses related to their research area with approval from their advisor.		6–8

**ELECTIVES LIST**

Code	Title	Hours
Select from the list below to complete the remaining 12–14 semester hours for the coursework requirement. Courses outside this list may be approved by the student's advisor.		12–14
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	

**Dissertation**

Code	Title	Hours
<i>Precandidacy</i>		
NETS 8986	Research	

Students should register for NETS 8986 between completion of the qualification exam and proposal defense.

Code	Title	Hours
<i>Dissertation</i>		
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	

**Dissertation Continuation**

Code	Title	Hours
NETS 9996	Dissertation Continuation	
NETS 9997	Dissertation Continuation	

## Program Credit/GPA Requirements

40 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

### Typical Plan of Study

#### Year 1

Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Two specialization courses		8 NETS 7334	4
		One elective course	4
			12
			12

#### Year 2

Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8

#### Year 3

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0

#### Year 4

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0

#### Year 5

Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

**Total Hours: 40**

### Alternate Plan of Study

#### Year 1

Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12

#### Year 2

Fall	Hours	Spring	Hours
Two specialization courses		8 Two elective courses	8
		8	8

#### Year 3

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0

#### Year 4

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0

Year 5				
Fall	Hours	Spring	Hours	
NETS 9991		0 NETS 9996		0
		0		0
<b>Total Hours: 40</b>				

## Artificial Intelligence, MS

The Master of Science in Artificial Intelligence program is designed to give students a comprehensive framework for AI with specialization in one of five areas: vision, intelligent interaction, robotics and agent-based systems, machine learning, and knowledge management and reasoning. Students may choose from three options: specialization, thesis, or coursework only. Students will engage in an extensive core intended to develop depth in all core concepts that build a foundation for AI theory and practice. Students will also be given the opportunity to build on the core knowledge of AI by taking a variety of elective courses, selected from colleges throughout campus, to explore key contextual areas or more complex technical applications. Program graduates will be well positioned to attain research and development positions in a rapidly growing field or to progress into doctoral-degree-related fields.

The Master of Science in Artificial Intelligence is comprised of eight courses: five core courses, two electives to be chosen from one of five specialization areas or coursework option, and one elective. The core courses are designed and developed by Khoury College faculty. Elective courses consist of graduate courses offered in Khoury and other partner colleges, including College of Arts, Media and Design; College of Engineering; College of Science; and College of Social Sciences and Humanities.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
<b>Intelligence</b>		
CS 5100	Foundations of Artificial Intelligence	4
<b>Programming and Algorithms</b>		
CS 5010	Programming Design Paradigm	4
CS 5800	Algorithms	4
<b>Machine Learning</b>		
CS 6140	Machine Learning	4
<b>Interaction</b>		
CS 5170	Artificial Intelligence for Human-Computer Interaction	4

## Options

Complete one of the following options:

### SPECIALIZATION OPTION

Code	Title	Hours
Complete two courses from one of the following specializations:		
<b>Vision</b>		
CS 5330	Pattern Recognition and Computer Vision	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5639	Computer Vision	
EECE 7370	Advanced Computer Vision	
<b>Intelligent Interaction</b>		

CS 5150	Game Artificial Intelligence
CS 5340	Computer/Human Interaction
CS 7340	Theory and Methods in Human Computer Interaction
<b>Robotics and Agent-Based Systems</b>	
CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems
EECE 5550	Mobile Robotics
EECE 5554	Robotics Sensing and Navigation
<b>Machine Learning</b>	
CS 5180	Reinforcement Learning and Sequential Decision Making
CS 6220	Data Mining Techniques
CS 7140 or EECE 7397	Advanced Machine Learning
CS 7150	Deep Learning
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5644	Introduction to Machine Learning and Pattern Recognition
MATH 7340	Statistics for Bioinformatics
<b>Knowledge Management and Reasoning</b>	
CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 7290	Special Topics in Data Science
Complete one course from the electives list below or an additional course chosen from the specialization area above, outside of the student's selected specialization area.	
	4

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives or specialization course lists. Students can take up to one course from any Khoury College 5000–6000-level course.		
		12

### THESIS OPTION

Code	Title	Hours
CS 7990	Thesis	4
CS 8674	Master's Project	4
Complete 4 semester hours from the electives or specialization course lists.		
		4

### Electives List

Code	Title	Hours
CS 7180	Special Topics in Artificial Intelligence	
CS 8674	Master's Project	
EECE 7337	Information Theory	
GSND 5110	Game Design and Analysis	
PHIL 5010	AI Ethics	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Complex Network Analysis, MS

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies.

The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4
NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4
NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

### Concentrations

Complete one of the following concentrations:

- Complex Social Systems (p. 351) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 351) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 351) (College of Science and Bouvé College of Health Sciences)

### Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	4
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

### Optional Co-op

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

## Program Credit/GPA Requirements

36–37 total semester hours required

Minimum 3.000 GPA required

### COMPLEX SOCIAL SYSTEMS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	6-8
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

### ECONOMIC AND TECHNOLOGICAL NETWORKS

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
CS 7150	Deep Learning	6-8
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

### POPULATION HEALTH DYNAMICS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
BINF 6308	Bioinformatics Computational Methods 1	6-8
NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

## Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that

generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science (p. 353)–(p. \_\_\_\_\_)Align (p. 353) fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 176).

## Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Algorithms</b>		
Complete 4 semester hours from the following:		
CS 5800	Algorithms	4
EECE 7205	Fundamentals of Computer Engineering	
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
<b>Presentation and Visualization</b>		
DS 5500	Data Science Capstone	4

## Electives

Code	Title	Hours
Complete 12 semester hours from the following: <sup>1</sup>		
<b>Khoury College of Computer Sciences</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
CS 7200	Statistical Methods for Computer Science	

CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 5983	Topics in Data Science
DS 7990	Thesis
DS 7995	Project
<b>College of Engineering</b>	
CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering
<b>College of Social Sciences and Humanities</b>	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
<b>College of Science</b>	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
<b>Bouvé College of Health Sciences</b>	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
<b>College of Arts, Media and Design</b>	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

- <sup>1</sup> Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

## Data Science, MS—Align

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science (p. 351) or Master of Science in Data Science—Align fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

The Master of Science in Data Science—Align curriculum is specifically designed to prepare incoming students without any prior programming experience. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students will take coursework in programming for data science, as well as linear algebra and probability.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 176).

### Align Bridge Coursework

Students are required to complete all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
<i>Fundamentals</i>		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
<i>Discrete Structures</i>		
CS 5002	Discrete Structures	4
<i>Programming for Data Science</i>		
DS 5010	Introduction to Programming for Data Science	4
<i>Additional Align Coursework</i>		
DS 5020	Introduction to Linear Algebra and Probability for Data Science	4

### Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses:

Code	Title	Hours
Complete 20 semester hours from the following:		
<b>Algorithms</b>		
Complete 4 semester hours from the following:		
CS 5800	Algorithms	4
EECE 7205	Fundamentals of Computer Engineering	
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
<b>Presentation and Visualization</b>		
DS 5500	Data Science Capstone	4

### Electives<sup>1</sup>

Code	Title	Hours
Complete 12 semester hours from the following:		
<b>Khoury College of Computer Sciences</b>		

CS 5100	Foundations of Artificial Intelligence
CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5610	Web Development
CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6240	Large-Scale Parallel Data Processing
CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 5983	Topics in Data Science
DS 7990	Thesis
DS 7995	Project
<b>College of Engineering</b>	
CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering
<b>College of Social Sciences and Humanities</b>	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
<b>College of Science</b>	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
<b>Bouvé College of Health Sciences</b>	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
<b>College of Arts, Media and Design</b>	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

## Program Credit/GPA Requirements

40–48 total semester hours required

Minimum 3.000 GPA required

- 1 Students taking electives worth less than 4 SH (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative SH to 4. In order to earn this additional 1 SH, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

## Game Science and Design, MS

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Core</b>		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130 and GSND 5131	Mixed Research Methods for Games and Recitation for GSND 5130	4
<b>Thesis</b>		
Students select Thesis or Capstone course in consultation with the program coordinator.		
GSND 6330 and GSND 6331	Player Experience and Recitation for GSND 6330	4
GSND 7990 or GSND 7980	Thesis Capstone	4

**Electives**

Code	Title	Hours
<b>Game Design or Development</b>		
Complete one of the following:		4
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	
GSND 6460	Generative Game Design	
<b>Game User Research or Analytics</b>		
Complete one of the following:		4
CS 5340	Computer/Human Interaction	
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
Code	Title	Hours
<b>Other Electives List</b>		
Complete any two of the previously listed courses or from the following (courses not listed below may be completed in consultation with your program coordinator).		8
If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.		
Elective courses outside of CAMD are subject to availability and registration policy of the home college.		
ARTG 5000	Topics in Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

**Program Credit/GPA Requirements**

34 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Sample Plan of Study****TWO YEARS, ONE (OPTIONAL) CO-OP**

Year 1	Fall	Hours	Spring	Hours	Summer Full Semester	Hours
	GSND 5110 and GSND 5111 and GSND 5112		5 Elective		4 Co-op (optional)	0
	GSND 5130 and GSND 5131		4 Elective		4	0

<b>Year 2</b>			
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>
GSND 5122		1 GSND 7990 or 7980	4
GSND 6330 and GSND 6331		4 Elective	4
Elective	4		
	<b>9</b>		<b>8</b>

Total Hours: 34

## Internet of Things, MS

The Master of Science in Internet of Things is an interdisciplinary program administered by the Institute for the Wireless Internet of Things, the Department of Electrical and Computer Engineering, and the Khouri College of Computer Sciences. This program is aimed at preparing highly qualified researchers and a specialized workforce that will lead the development of a globally interconnected continuum of untethered devices and objects interacting with the physical environment, people, and each other. The program will provide students with the necessary knowledge and skills to understand, design, and implement autonomous wireless networked systems of tomorrow operating in uncertain, challenging, extreme environments through a combination of coursework, master project research, and/or industry experience.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Fundamental Requirements

<b>Code</b>	<b>Title</b>	<b>Hours</b>
EECE 5155	Wireless Sensor Networks and the Internet of Things	4
Complete one of the following:		4
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	
Complete one of the following:		4
CS 5800	Algorithms	
CS 7800	Advanced Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Complete one of the following:		4
CS 6140	Machine Learning	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)	
Complete one of the following:		4
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7368	High-Level Design of Hardware-Software Systems	
Complete one of the following for a total of 4 semester hours:		4
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
INNO 6230 and EECE 7400	Platform Innovation and Advanced Special Problems in Electrical and Computer Engineering	
MGMT 6280 and EECE 7400	Innovation for Next-Generation Products and Systems and Advanced Special Problems in Electrical and Computer Engineering	
Complete one of the following:		4
CY 5120	Applied Cryptography	
CY 5150	Network Security Practices	

CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
EECE 5641	Introduction to Software Security
EECE 5699	Computer Hardware and System Security

## Options

### COURSEWORK OPTION

Code	Title	Hours
Complete 4 semester hours from the concentration course list below. (p. 359)		

### MASTER'S PROJECT OPTION

Code	Title	Hours
EECE 7945	Master's Project	4

## Concentration Course List

Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the program director.

Code	Title	Hours
<b>Courses in College of Engineering</b>		
<i>Electrical and Computer Engineering</i>		
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5606	Micro- and Nanofabrication	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5666	Digital Signal Processing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networked XR Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications)	
EECE 5699	Computer Hardware and System Security	
EECE 7150	Autonomous Field Robotics	
EECE 7200	Linear Systems Analysis	
EECE 7201	Solid State Devices	
EECE 7202	Electromagnetic Theory 1	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	

EECE 7275	Antennas and Radiation
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7390	Computer Hardware Security
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances on Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
<i>Bioengineering</i>	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
<i>Civil and Environmental Engineering</i>	
CIVE 5280	Remote Sensing of the Environment
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
CIVE 7151	Urban Informatics and Processing
CIVE 7380	Performance Models and Simulation of Transportation Networks
<b>Courses Outside College of Engineering</b>	
<b>Khoury College of Computer Science</b>	
<i>Computer Science</i>	
CS 5700	Fundamentals of Computer Networking
CS 6140	Machine Learning
CS 7150	Deep Learning
<i>Cybersecurity</i>	
CY 5120	Applied Cryptography
CY 5150	Network Security Practices
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
<b>D'Amore-McKim School of Business</b>	
<i>Entrepreneurship and Innovation</i>	
INNO 6200	Enterprise Growth and Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets
<i>Management</i>	
MGMT 6280	Innovation for Next-Generation Products and Systems
<i>Entrepreneurship Technological</i>	
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
<b>Bouvé College of Health Sciences</b>	

**Health Informatics**

HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6400	Introduction to Health Data Analytics

**Nursing**

NRSG 6306	Health Informatics
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**College of Arts, Media and Design***Communication Studies*

COMM 6605	Youth and Communication Technology
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**School of Law**

LW 6101	Introduction to Legal Studies 1: Law and Legal Reasoning
LW 6102	Introduction to Legal Studies 2
LW 6140	Data Regulation and Compliance
LW 6231	Identifying and Securing Intellectual Property Rights
LW 6232	Intellectual Property and Media
LW 6400	Law, Policy and Legal Argument
LW 7369	Intellectual Property
LW 7669	Law and Technology

**College of Social Sciences and Humanities***Law and Public Policy*

LPSC 7312	Cities, Sustainability, and Climate Change
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*Public Policy and Urban Affairs*

PPUA 5262	Big Data for Cities
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*Political Science*

POLS 7341	Security and Resilience Policy
POLS 7346	Resilient Cities

*Philosophy*

PHIL 5005	Information Ethics
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**College of Science***Physics*

PHYS 5116	Network Science 1
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**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Robotics, MS**For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted (as of Spring 2025) to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

**Gordon Institute of Engineering Leadership****Master's Degree in Robotics with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
Complete one of the following:		
ME 5250	Robot Mechanics and Control	4
ME 5659	Control Systems Engineering	
<b>Electrical and Computer Engineering</b>		
Complete one of the following:		
EECE 5550	Mobile Robotics	4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
Complete one of the following:		
CS 5180	Reinforcement Learning and Sequential Decision Making	4
CS 5335	Robotic Science and Systems	

### Concentrations

Complete one of the following concentrations:

- Computer Science (p. 362)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 363)—College of Engineering
- Mechanical Engineering (p. 363)—College of Engineering

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
<b>Required Course</b>		
Complete one additional CS course not used to fulfill the core requirements:		
CS 5180	Reinforcement Learning and Sequential Decision Making	4
CS 5335	Robotic Science and Systems	
<b>Complete one of the following options:</b>		
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 363)		
<i>Project Option</i>		
CS 8674	Master's Project	4
Complete 12 semester hours of courses from the elective course list. (p. 363)		
<i>Thesis Option</i>		
CS 8674	Master's Project	4
CS 7990	Thesis	4
Complete 8 semester hours of courses from the elective course list. (p. 363)		
		8

**ELECTRICAL AND COMPUTER ENGINEERING**

Code	Title	Hours
Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.		
<b>Required Course</b>		
Complete one additional EECE course not used to fulfill the core requirements:		
EECE 5550	Mobile Robotics	4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Complete one of the following options:</b>		
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 363)		
<i>Project Option</i>		
EECE 7945	Master's Project	4
Complete 12 semester hours of courses from the elective course list. (p. 363)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
Complete 8 semester hours of courses from the elective course list. (p. 363)		
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		

**MECHANICAL ENGINEERING**

Code	Title	Hours
Students in the mechanical engineering concentration follow the College of Engineering co-op policies.		
<b>Required Course</b>		
Complete one additional ME course not used to fulfill the core requirements:		
ME 5250	Robot Mechanics and Control	4
ME 5659	Control Systems Engineering	
<b>Complete one of the following options:</b>		
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 363)		
<i>Project Option</i>		
ME 7945	Master's Project	4
Complete 12 semester hours of courses from the elective course list. (p. 363)		
<i>Thesis Option</i>		
ME 7945	Master's Project	4
ME 7990	Thesis	4
Complete 8 semester hours of courses from the elective course list. (p. 363)		
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		

**Elective Course List**

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	

CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 6250	Wearable Robotics
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

## Statistics, MS

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

### Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 366) (Bouvé College of Health Sciences)
- Statistical Machine Learning (p. 366) (Khoury College of Computer Sciences)
- Statistical Theory and Modeling (p. 366) (College of Science)

### Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

### Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	0
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	0

### Program Credit/GPA Requirements

31–32 total semester hours required

Minimum 3.000 GPA required

**BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)**

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	12
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Statistics, MS—Connect**

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		
CS 5001	Intensive Foundations of Computer Science	8-10
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

## Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

## Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 367) (Bouvé College of Health Sciences (<http://northeastern.edu/bouve/>))
- Statistical Machine Learning (p. 368) (Khoury College of Computer Sciences (<https://khoury.northeastern.edu/>))
- Statistical Theory and Modeling (p. 368) (College of Science (<http://www.northeastern.edu/cos/>))

## Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		
MATH 6910	Master's Project	2
PHTH 6880	Statistical Consultancy	

## Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	

## Program Credit/GPA Requirements

39-41 total semester hours required

Minimum 3.000 GPA required

## BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	

PHTH 6802	Causal Inference 2
PHTH 6810	Survival Analysis
PHTH 6820	Design and Analysis of Clinical Trials

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Computer Science, MSCS**

Northeastern University's Master of Science in Computer Science is designed to prepare students for a variety of careers in computer science. The program combines both computing and important application domains—enabling you to increase your broad-based knowledge in the field while allowing you to delve deeper in specific areas through elective courses.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 176).

**Core Requirements**

Code	Title	Hours
<b>Programming</b>		
CS 5010	Programming Design Paradigm	4
<b>Algorithms</b>		
CS 5800	Algorithms	4

**Breadth Areas**

Code	Title	Hours
Complete three courses from two of the following breadth areas:		12
<i>Systems and Software</i>		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	

CS 5850	Building Game Engines
CS 6410	Compilers
CS 6510	Advanced Software Development
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 6710	Wireless Network
<i>Theory and Security</i>	
CS 6760	Privacy, Security, and Usability
CS 7805	Complexity Theory
CY 5770	Software Vulnerabilities and Security
CY 6740	Network Security
<i>Artificial Intelligence and Data Science</i>	
CS 5100	Foundations of Artificial Intelligence
CS 5150	Game Artificial Intelligence
CS 5200	Database Management Systems
CS 5330	Pattern Recognition and Computer Vision
CS 6120	Natural Language Processing
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

## Electives

Code	Title	Hours
Complete 12 semester hours from the following: <sup>1</sup>		
CS 5097	Mixed Reality	
CS 5100 to CS 7980		12
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
DS 5110	Introduction to Data Management and Processing	
DS 5230	Unsupervised Machine Learning and Data Mining	

<sup>1</sup> Specific electives such as CS 7980 Research Capstone, CS 7990 Thesis, or CS 8674 Master's Project may be required at certain Northeastern campuses. Students should consult with their program advisor when developing a plan of study.

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Computer Science, MSCS—Align

Master of Science in Computer Science—Align students come from a wide variety of backgrounds, with undergraduate majors including math, biology, history, engineering, and classics. The program begins with a two-semester introductory sequence, which provides the foundational knowledge for students from nontechnical backgrounds to succeed. Students have an opportunity to acquire both the knowledge needed to transition into a new career and the practical skills to build the next great app.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Align Bridge Coursework

Students are required to take all bridge courses unless otherwise determined by the program.

A grade of B or higher is required in each course.

Code	Title	Hours
<i>Fundamentals</i>		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
<i>Discrete Structures</i>		
CS 5002	Discrete Structures	4
<i>Object-Oriented Design</i>		
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
<i>Additional ALIGN courses</i>		
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

## Core Requirements

Code	Title	Hours
<i>Algorithms</i>		
CS 5800	Algorithms	4

## Breadth Areas

Code	Title	Hours
Select three courses from two of the three following breadth areas:		
<i>Systems and Software</i>		
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5520	Mobile Application Development	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5850	Building Game Engines	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 6710	Wireless Network	
<i>Theory and Security</i>		
CS 6760	Privacy, Security, and Usability	
CS 7805	Complexity Theory	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
<i>Artificial Intelligence and Data Science</i>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 6120	Natural Language Processing	

CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
CS 6240	Large-Scale Parallel Data Processing
CS 7140	Advanced Machine Learning

## Electives

Code	Title	Hours
Complete 12 semester hours from the following: <sup>1</sup>		
CS 5097	Mixed Reality	12
CS 5100 to CS 7980		
CS 7990	Thesis	
CS 8674	Master's Project	
CS 8982	Readings	
CY 5010	Cybersecurity Principles and Practices	
CY 5130	Computer System Security	
CY 5210	Information System Forensics	
DS 5110	Introduction to Data Management and Processing	
DS 5230	Unsupervised Machine Learning and Data Mining	

<sup>1</sup> Specific electives such as CS 7980 Research Capstone, CS 7990 Thesis, or CS 8674 Master's Project may be required at certain Northeastern campuses. Students should consult with their program advisor when developing a plan of study.

## Program Credit/GPA Requirements

36-44 total semester hours required

Minimum 3.000 GPA required

### Cloud Software Development, Graduate Certificate

The Graduate Certificate in Cloud Software Development is designed to give students a strong foundation for working with cloud computing platforms like Amazon Web Services, Google Cloud, and Microsoft Azure. Through coursework and project-based learning, students gain the exposure needed to work across these platforms and also in hybrid platform environments. Cloud skills are in higher demand than ever before. However, there is a significant lack of qualified, skilled professionals to support this growth, especially for deployment in non-tech-related industries—such as manufacturing, transportation, travel, entertainment, and education—that rely increasingly on cloud platforms as part of their day-to-day operations. This certificate is aimed at addressing this skills gap utilizing the Khoury Align program's innovative curriculum and student support model, as well as course-based experiential learning opportunities to train students for in-demand and high-paying jobs.

### Prerequisite

To ensure that all students have the foundation necessary to be successful in this program, each incoming student must demonstrate that they have taken undergraduate or graduate coursework in computer science or that they have comparable professional experience. This admission requirement can also be fulfilled by successful completion of Intensive Foundations of Computer Science (CS 5001).

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CS 5004	Object-Oriented Design	4
CS 5610	Web Development	4

CS 6510	Advanced Software Development	4
CS 6620	Fundamentals of Cloud Computing	4

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Computer Science, Graduate Certificate

The postbaccalaureate certificate is designed to give students a solid foundation in the mathematical and theoretical underpinnings of computer science, including the areas of discrete mathematics, basic programming, data structures, object-oriented programming, algorithms, and computer systems. The goal of the certificate is to provide foundational knowledge in computer science that is valuable in both the workplace for career advancement, as well as to those looking to move into graduate programs within the discipline.

The courses in the Postbaccalaureate Certificate in Computer Science will serve as the foundational premaster's courses in the Align program. Students that successfully complete the five certificate courses with a B in each course or better will be eligible to matriculate into the Master of Science in Computer Science program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
CS 5002	Discrete Structures	4
CS 5004 and CS 5005	Object-Oriented Design and Recitation for CS 5004	4
CS 5008 and CS 5009	Data Structures, Algorithms, and Their Applications within Computer Systems and Recitation for CS 5008	4

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Data Analytics, Graduate Certificate

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/>).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Inclusive Computer Science Education, Graduate Certificate

#### Overview

This program is offered at the Portland, Maine campus.

The Graduate Certificate in Inclusive Computer Science Education is designed to prepare students to teach computer science principles and concepts in the context of a K–12 environment. Building on the successful Computer Science—Align program, this certificate assumes no prior computer science experience. Through coursework and project-based learning, students have an opportunity to obtain the foundational knowledge necessary to teach basic computing concepts and programming at a variety of educational levels both as stand-alone courses and integrated into other disciplines. The certificate emphasizes how teachers can create an inclusive classroom environment, actively work to dispel stereotypes, and build student confidence. Students who finish this certificate will be well positioned to obtain K–12 certification in computer science.

#### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CS 5001	Intensive Foundations of Computer Science	4
CS 5002	Discrete Structures	4
CS 5933	Advanced Computer Science Topics for Teachers	4
CS 5934	Introduction to Inclusive Computer Science Teaching	4

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Cybersecurity

Students can apply for admission to two distinct degree programs.

#### Doctor of Philosophy (PhD) in Cybersecurity

A research-based, interdisciplinary PhD in cybersecurity spans theory and systems, from hardware to software security, from cryptography to policy, and from malware to wireless security. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet

in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

## **Master of Science (MS) in Cybersecurity**

An industry-focused, interdisciplinary Master of Science in Cybersecurity combines knowledge of information security technology and cybersecurity hands-on tools with relevant knowledge from law, the social sciences, criminology, and management. The Master of Science in Cybersecurity is designed for students focused on cybersecurity careers in companies or government agencies, thus applying their knowledge to their workplaces to assess security threats and manage information security risks and technical and policy controls.

Northeastern University designations by the National Security Agency and the Department of Homeland Security:

- NSA/DHS Center of Academic Excellence in Cybersecurity—Cyber Defense Education
- NSA/DHS Center of Academic Excellence in Cybersecurity—Research
- NSA/DHS Center of Academic Excellence in Cybersecurity—Cyber Operations

## **Align Master of Science (MS) in Cybersecurity**

Without exception, every organization needs to protect their information system. Every day cyber risks are becoming more complex, and the sophistication and number of threats is growing continuously. For these reasons, cybersecurity professionals need to become more prepared, with a very solid background and with the capacity to evolve and adapt to the current and future information systems challenges.

Organizations are looking for well-rounded cybersecurity professionals who, beside their understanding of information technologies, can also comprehend the many other dimensions that contribute to effective and efficient information systems security. Professionals with diversified backgrounds are particularly interesting because they are able to provide different approaches to complex cybersecurity problems.

Align-MSCY students are perfect cybersecurity professionals, because they have proven their adaptability to the cybersecurity field and also because they bring an invaluable experience and knowledge from other areas to contribute to a global perspective of an organization's cybersecurity posture.

## **Programs**

### **Doctor of Philosophy (PhD)**

- Cybersecurity (p. 374)

### **Master of Science**

- Cybersecurity (p. 378)
- Cybersecurity—Align (p. 380)

### **Graduate Certificate**

- Cybersecurity (p. 382)

## **Cybersecurity, PhD**

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern University's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's

faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and “smart” IoT applications to tomorrow’s self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.

- The International Secure Systems Lab (<http://www.iseclab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
- The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation’s largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

## Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester semester hours beyond a bachelor’s degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master’s degree en route to the PhD.

## Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 GPA, with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

### RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

### TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

### DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

### DISSERTATION COMMITTEE

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD cybersecurity curriculum committee. The four members must include the advisor, two internal members, and an external member.

### COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

### DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

### AWARDING OF MASTER’S DEGREES

Students who enter the PhD in Cybersecurity program with a bachelor’s degree have the option of earning a master’s degree from one of the departments participating in the program. To do so, they must meet all of the department’s degree requirements.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Teaching
- Qualifying exam and area exam
- Annual review
- Dissertation proposal
- Dissertation committee
- Dissertation defense

### Core Requirements

A grade of B or higher is required in each core course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
<b>Foundations</b>		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
CY 5770 or EECE 5641	Software Vulnerabilities and Security Introduction to Software Security	4
CY 6740 or EECE 5699	Network Security Computer Hardware and System Security	4

### Electives and Tracks

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
<b>Tracks</b>		
Select at least two courses from one track:		8
<i>Hardware Security</i>		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
<i>Machine Learning</i>		
CS 5700	Fundamentals of Computer Networking	
CS 6140	Machine Learning	
CS 7150	Deep Learning	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
<i>Network Security</i>		
CS 6710	Wireless Network	
CY 6740	Network Security	
CS 7610	Foundations of Distributed Systems	
CS 7775	Seminar in Computer Security	
CY 5130	Computer System Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
<i>Systems Security</i>		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	

CS 7610	Foundations of Distributed Systems
CY 5130	Computer System Security
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
EECE 7352	Computer Architecture
<b>Theory</b>	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7870	Seminar in Theoretical Computer Science
EECE 7337	Information Theory
<b>Usable Security and Privacy</b>	
CS 6350	Empirical Research Methods
CS 6760	Privacy, Security, and Usability
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
<b>Cybersecurity Policy</b>	
CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy
<b>Electives</b>	

Selected in consultation with advisor from graduate-level CS and ECE courses and graduate-level courses offered by the College of Social Sciences and Humanities, including CRIM, CS, CY, DS, EECE, INSH, MATH and POLS. 28

## Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Degree Requirements

Incoming PhD in Cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester

hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

## **Doctoral Degree Candidacy**

Refer to the PhD Cybersecurity overview (p. 374) for admission to candidacy requirements.

## **Residency**

Refer to the PhD Cybersecurity overview (p. 374) for residency requirements.

## **Teaching Requirement**

Refer to the PhD Cybersecurity overview (p. 374) for teaching requirements.

## **Dissertation Advising**

Refer to the PhD Cybersecurity overview (p. 374) for dissertation advising requirements.

## **Dissertation Committee**

Refer to the PhD Cybersecurity overview (p. 374) for dissertation committee requirements.

## **Comprehensive Examination**

Refer to the PhD Cybersecurity overview (p. 374) for comprehensive examination requirements.

## **Dissertation Defense**

Refer to the PhD Cybersecurity overview (p. 374) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

## **Milestones**

Teaching

Qualifying exam and area exam

Annual review

Dissertation proposal

Dissertation committee

Dissertation defense

## **Core Requirement**

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Consult your faculty advisor for approved courses.		16

## **Dissertation**

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

## **Program Credit/GPA Requirements**

Minimum 16 semester hours required

Minimum 3.000 GPA required

## **Cybersecurity, MS**

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law, the social sciences, criminology, and management. The MS program is designed for working professionals and also recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

The cybersecurity program provides graduates with both the theoretical and experimental skills to perform professional cybersecurity duties. Due to the broad variety of positions that cybersecurity professionals may hold in the industry, our curriculum is designed to provide enough flexibility to our students to tailor their own careers appropriately.

The cybersecurity curriculum is intended to provide a comprehensive approach to cybersecurity, which includes both the technical skills and the contextual understanding that are fundamental to cybersecurity professions.

## Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason, they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The optional concentration in criminology will offer MSCY students an opportunity to obtain the fundamental principles and the most important practices that criminal justice professionals use.

## Gordon Institute of Engineering Leadership

### MASTER'S DEGREE IN CYBERSECURITY WITH GRADUATE CERTIFICATE IN ENGINEERING LEADERSHIP

Students may complete a Master of Science in Cybersecurity in addition to earning a Graduate Certificate in Engineering Leadership (p. 609).

Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour master's degree and certificate require 24 hours from the Master of Science in Cybersecurity (MS required courses, technical track, and contextual track).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
<b>Foundations</b>		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses <sup>1</sup>	4
CY 5010	Cybersecurity Principles and Practices	4
<b>Technical Track</b>		
Complete 8 semester hours from the following:		8
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
<b>Contextual Track</b>		
Complete 8 semester hours from the following:		8
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
<b>Capstone</b>		
CY 7900	Capstone Project	4

## Electives

Code	Title	Hours
Complete 4 semester hours from the following:		
CRIM 6200	Criminology	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	

CS 5200	Database Management Systems
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 6710	Wireless Network
CS 7580	Special Topics in Software Engineering
CS 7805	Complexity Theory
CY 5061	Cloud Security
CY 5120	Applied Cryptography
CY 5130	Computer System Security
CY 5150	Network Security Practices
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 5770	Software Vulnerabilities and Security
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
CY 7790	Special Topics in Security and Privacy
POLS 7341	Security and Resilience Policy
PPUA 6503	Managing People in Public and Nonprofit Sectors

## Concentration in Criminology

This optional concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code Required	Title	Hours
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Complete one of the following:		4
CRIM 6262	Evidence-Based Crime Policy	
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective <sup>2</sup>		

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> A student who demonstrates prior mastery of the learning outcomes for Cybersecurity: Technologies, Threats, and Defenses (CY 5001) may replace the course with elective coursework to meet the semester hours required for the degree. See the electives list for options.

<sup>2</sup> CRIM elective to be approved by director/associate director of MSCY.

## Cybersecurity, MS—Align

The Master of Science in Cybersecurity—Align program is designed for students with a BS/BA degree from all backgrounds. During the first semester of year one, students are expected to take foundational courses in computer science fundamentals, as well as a course in data structures/discrete mathematics. During their second semester, students take coursework in foundations of cybersecurity.

Our Master of Science in Cybersecurity combines a solid understanding of information security technology with relevant knowledge from law and ethics, the social sciences, criminology, and management. The MS program is designed for working professionals and recent graduates who want knowledge they can apply in workplaces to assess and manage information security risks effectively.

The cybersecurity program provides graduates with both the theoretical understanding and technical skills to perform professional cybersecurity duties. Due to the broad variety of positions that cybersecurity professionals may hold in the industry, our curriculum is designed to provide enough flexibility to our students to tailor their own careers appropriately.

The cybersecurity curriculum is intended to provide a comprehensive approach to cybersecurity, which includes both the technical skills and the contextual understanding that are fundamental to cybersecurity professions.

## Concentration in Criminology

Cybercrime has evolved into more advanced techniques and sophisticated structures. Cybersecurity professionals are of vital importance in crime investigations, and for that reason, they need to have a well-rounded background and knowledge. The Master of Science in Cybersecurity provides an interdisciplinary foundation that includes computer science technical courses, complemented with the contextual knowledge courses required for a proper holistic approach to cybercrime. The optional concentration in criminology will offer MSCY students an opportunity to obtain the fundamental principles and the most important practices that criminal justice professionals use.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Align Bridge Coursework

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Fundamentals</b>		
CS 5001 and CS 5003	Intensive Foundations of Computer Science and Recitation for CS 5001	4
<b>Discrete Structures</b>		
CS 5002	Discrete Structures	4
<b>Cybersecurity</b>		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
<b>Additional Align Courses</b>		
CY 5003	Foundations of Software Security	4

### Core Requirements

Code	Title	Hours
<b>Foundations</b>		
CY 5010	Cybersecurity Principles and Practices	4
<b>Technical Track</b>		
Complete 8 semester hours from the following:		
CY 5120	Applied Cryptography	8
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5770	Software Vulnerabilities and Security	
CY 6120	Software Security Practices	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
<b>Contextual Track</b>		
Complete 8 semester hours from the following:		
CY 5200	Security Risk Management and Assessment	8
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	

**Capstone**

CY 7900	Capstone Project	4
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**Electives**

Code	Title	Hours
Complete 4 semester hours from the following:		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 6710	Wireless Network	
CS 7580	Special Topics in Software Engineering	
CS 7805	Complexity Theory	
CY 5061	Cloud Security	
CY 5120	Applied Cryptography	
CY 5130	Computer System Security	
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5770	Software Vulnerabilities and Security	
CY 6200	Special Topics in IT Security Governance, Risk, and Compliance	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
CY 7790	Special Topics in Security and Privacy	
POLS 7341	Security and Resilience Policy	
PPUA 6503	Managing People in Public and Nonprofit Sectors	

**Concentration in Criminology**

This optional concentration's required courses may count toward the contextual track, and its elective may count toward the major's elective area.

Code	Title	Hours
<b>Required</b>		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
Complete one of the following:		
CRIM 6262	Evidence-Based Crime Policy	4
CY 5250	Decision Making for Critical Infrastructure	
CRIM elective <sup>1</sup>		

**Program Credit/GPA Requirements**

36–44 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> CRIM elective to be approved by director/associate director of MSCY.

**Cybersecurity, Graduate Certificate**

The certificate is designed to give students a solid foundation in cybersecurity. In the course work, students have the opportunity to be exposed to fundamental cybersecurity principles and information security concepts related to information systems, to explore issues involved in the security

of computer systems, and to explore the techniques used in computer forensic examination. The goal of the certificate is to provide prospective cybersecurity professionals with an entry point to industry positions within eight months from admission and with reduced financial investment.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CY 5010	Cybersecurity Principles and Practices	4
CY 5130	Computer System Security	4
CY 5210	Information System Forensics	4

### Elective

Code	Title	Hours
Complete one of the following:		4
CY 5150	Network Security Practices	
CY 5200	Security Risk Management and Assessment	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Interdisciplinary Programs

#### Doctor of Philosophy (PhD)

- Network Science (p. 344)
- Personal Health Informatics (p. 387)

#### Master of Science (MS)

- Complex Network Analysis (p. 349)
- Data Science (p. 351)
- Game Science and Design (p. 226)
- Health Informatics (p. 652)
- Internet of Things (p. 358)
- Robotics (p. 361)
- Statistics (p. 364)
- Statistics—Connect (p. 366)

#### Graduate Certificate

- Data Analytics (p. 372)

### Network Science, PhD

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing various fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This doctoral program trains students in network science across several colleges—the College of Social

Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. See other collaborating colleges' catalog sections for possible elective courses.

Coursework depends on a student's area of research and is subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 semester hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

## **Annual Review**

A review of satisfactory progress will be ongoing and formally evaluated at the end of the program's first and second years. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

Each student will have a primary dissertation advisor from the network science doctoral program faculty. The dissertation advisor should be selected by the end of the program's second year's spring semester.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty.

## **Alternate Course Path**

Students have the option to complete core coursework in their first year of study. This curriculum pathway is mandatory for students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

## **Qualifying Examination**

The qualification exam is an oral examination of the material covered in the core curriculum. The exam will be an hour long and consist of questions selected by network science faculty. Students will receive between 50 to 80 questions to review for one month before the exam—a subset of which will make up the exam.

All students are required to sit for the exam in the fall, typically in their third year of the PhD program. Students who fail to pass the qualifying exam on their first attempt are expected to retake it in the spring term.

Students following the alternate path may take the exam at the end of the first academic year, upon completion of the required core courses.

Students may only take the qualifying exam twice.

## **Dissertation Proposal**

Students must submit a written dissertation proposal to the dissertation committee. The proposal should identify relevant literature, the research problem, plan, and the potential impact on the field. The proposal will be presented in an open forum before a public audience and the dissertation committee, followed by questions from noncommittee members. The written proposal must be given to committee members at least two weeks before the oral presentation. After the presentation, the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation. The comprehensive exam must precede the final dissertation defense by at least one year.

Students may repeat the comprehensive examination once if they are unsuccessful.

## **Degree Candidacy**

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## **Dissertation Defense**

A PhD student must complete and defend a dissertation involving original network science research. The dissertation defense must adhere to the dissertation policies of the College of Social Science and Humanities (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>).

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*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.*

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying exam  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

## Specializations

Complete 20 additional semester hours in one of the following specializations or another course of study with written approval from your advisor.

- Computer Science (p. 345)
- Epidemiology (p. 346)
- Math (p. 346)
- Physics/Theory (p. 346)
- Social Science (p. 346)
- Independent (p. 346)

### COMPUTER SCIENCE SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140 or CS 6220	Machine Learning Data Mining Techniques	4

### EPIDEMIOLOGY SPECIALIZATION

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

### MATH SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4

### PHYSICS/THEORY SPECIALIZATION

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7321	Computational Physics	4

### SOCIAL SCIENCE SPECIALIZATION

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4

**INDEPENDENT SPECIALIZATION**

Code	Title	Hours
	Students must choose two courses related to their research area with approval from their advisor.	6–8

**ELECTIVES LIST**

Code	Title	Hours
	Select from the list below to complete the remaining 12–14 semester hours for the coursework requirement. Courses outside this list may be approved by the student's advisor.	12–14

CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	

**Dissertation**

Code	Title	Hours
<i>Precandidacy</i>		
NETS 8986	Research	
	Students should register for NETS 8986 between completion of the qualification exam and proposal defense.	
<i>Dissertation</i>		
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	
<i>Dissertation Continuation</i>		
	Following completion of NETS 9990 and 9991, registration in the following is required each semester until the dissertation is completed:	
NETS 9996	Dissertation Continuation	

**Program Credit/GPA Requirements**

40 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Typical Plan of Study**

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Two specialization courses		8 NETS 7334	4
		One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8

<b>Year 3</b>			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
<b>Year 4</b>			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
<b>Year 5</b>			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

**Total Hours: 40**

## Alternate Plan of Study

<b>Year 1</b>			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
<b>Year 2</b>			
Fall	Hours	Spring	Hours
Two specialization courses		8 Two elective courses	8
		8	8
<b>Year 3</b>			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
<b>Year 4</b>			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
<b>Year 5</b>			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

**Total Hours: 40**

## Personal Health Informatics, PhD

Northeastern University's Doctor of Philosophy in Personal Health Informatics is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health

- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

## **Admission Requirements**

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry; otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate GPA
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

## **Minimum Academic Standards and Requirements**

### **RESIDENCY REQUIREMENT**

The residency requirement will follow the university's residency requirement for PhD programs (<https://catalog.northeastern.edu/graduate/general-admission-transfer-credit/regulations-phd-programs/>).

### **TEACHING REQUIREMENT**

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

### **DISSERTATION ADVISING**

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

### **DISSERTATION COMMITTEE**

The committee will consist of at least three members: the dissertation advisor, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation advisor must be a full-time member of the Northeastern faculty.

### **QUALIFYING EXAMINATION**

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

## DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

## COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

## DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

## Curriculum Requirements

### REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series during semesters when it is run.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Qualifying examination

Annual review

Dissertation proposal

Dissertation committee

Dissertation defense

## Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
<b>Foundations</b>		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
<b>Program Design and Development</b>		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
<b>Methods and Statistics</b>		
CS 7300	Empirical Research Methods for Human Computer Interaction	4
Complete one of the following:		3-4
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
<b>Evaluation</b>		

HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

**Electives**

Code	Title	Hours
Complete 12–17 semester hours in the following subject areas to fulfill the minimum program hours (see faculty advisor for other acceptable elective courses):		
CAEP		
CS		
HINF		
PTH		

**Dissertation**

Code	Title	Hours
HINF 9990	Dissertation Term 1	
HINF 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Sample Plan of Study**

Code	Title	Hours
<b>Year 1</b>		
<i>Fall Semester</i>		
CS 7340	Theory and Methods in Human Computer Interaction	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
<i>Spring Semester</i>		
CS 5010 or CS 5520	Programming Design Paradigm Mobile Application Development	
CS 7300	Empirical Research Methods for Human Computer Interaction	
<b>Year 2</b>		
<i>Fall Semester</i>		
HINF 5300	Personal Health Interface Design and Development	
PHTH 5210 or PHTH 6440	Biostatistics in Public Health Advanced Methods in Biostatistics	
or CAEP 7712 or CS 7200	Intermediate Statistical Data Analysis Techniques Statistical Methods for Computer Science	
<i>Spring Semester</i>		
HINF 5301	Evaluating Health Technologies	
Personal health informatics electives		
<b>Year 3</b>		
<i>Fall Semester</i>		
HINF 9990	Dissertation Term 1	
HINF 8982	Readings	
<i>Spring Semester</i>		
HINF 9991	Dissertation Term 2	
Personal health informatics electives		
<b>Year 4</b>		
<i>Fall Semester</i>		
HINF 9996	Dissertation Continuation	
<i>Spring Semester</i>		
HINF 9996	Dissertation Continuation	
<b>Year 5</b>		

**Fall Semester**

HINF 9996	Dissertation Continuation
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**Spring Semester**

HINF 9996	Dissertation Continuation
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## Complex Network Analysis, MS

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## **Required Courses**

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4
NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4
NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

## **Concentrations**

Complete one of the following concentrations:

- Complex Social Systems (p. 351) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 351) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 351) (College of Science and Bouvé College of Health Sciences)

## Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	4
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

## Optional Co-op

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

## Program Credit/GPA Requirements

36–37 total semester hours required

Minimum 3.000 GPA required

## COMPLEX SOCIAL SYSTEMS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

## ECONOMIC AND TECHNOLOGICAL NETWORKS

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
CS 7150	Deep Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

## POPULATION HEALTH DYNAMICS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
BINF 6308	Bioinformatics Computational Methods 1	
NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	

Complete 4–6 semester hours from the following:

4-6

NETS 6061	Analyzing Higher-Order Networks
NETS 6063	Probabilistic Mathematics of Networks
NETS 6099	Special Topics in Complex Networks

## Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science (p. 353)–(p. )Align (p. 353) fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 176).

## Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Algorithms</b>		
Complete 4 semester hours from the following:		
CS 5800	Algorithms	4
EECE 7205	Fundamentals of Computer Engineering	
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
<b>Presentation and Visualization</b>		
DS 5500	Data Science Capstone	4

## Electives

Code	Title	Hours
Complete 12 semester hours from the following: <sup>1</sup>		
<b>Khoury College of Computer Sciences</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	

CS 6120	Natural Language Processing
CS 6200	Information Retrieval
CS 6240	Large-Scale Parallel Data Processing
CS 6350	Empirical Research Methods
CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 5983	Topics in Data Science
DS 7990	Thesis
DS 7995	Project
<b>College of Engineering</b>	
CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering
<b>College of Social Sciences and Humanities</b>	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
<b>College of Science</b>	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
<b>Bouvé College of Health Sciences</b>	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
<b>College of Arts, Media and Design</b>	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

## Game Science and Design, MS

The **Master of Science (MS) in Game Science and Design** is a program that seeks to give students a comprehensive understanding of how successful game products are created in a player-centric environment. Successful graduates who wish to become professional game developers or game user research experts should be able to collaborate effectively in this dynamic and burgeoning field of practice and research. Focusing on the science of game development, students have an opportunity to learn the design and technological skills needed to build a game and develop a deep understanding of playability and analytics that makes products successful in an increasingly competitive marketplace.

The game industry has expanded to include social and mobile gaming; augmented and virtual reality; as well as games in health, education, and training. Rapid innovations are happening in player psychology, middleware, graphics and authoring tools, game mechanics, and artificial intelligence and narrative techniques. It has become an increasingly competitive space.

The selectiveness of the industry and the diversity of the skills required mean that students seeking entry need both broad and deep skills. As an emergent industry using diverse technology and collaborative practices, the game industry needs professionals with interdisciplinary skill sets who can blend knowledge about development with knowledge about evaluation methods and players' behavior and psychology.

Jointly offered by Northeastern's College of Arts, Media and Design and Khoury College of Computer Sciences (<https://www.khoury.northeastern.edu/>), the **Master of Science in Game Science and Design** is a one-of-a-kind interdisciplinary program that seeks to prepare students to meet this need by weaving together science and design. This is a two-year, 34-semester-hours program.

All admitted students will be assigned to an advisor who will help them select a pathway with a coherent set of electives depending on their career goals. The advisor will also monitor their progress through the master's degree.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
GSND 5110 and GSND 5111 and GSND 5112	Game Design and Analysis and Seminar for GSND 5110 and Recitation for GSND 5110	5
GSND 5122	Business Models in the Game Industry	1
GSND 5130 and GSND 5131	Mixed Research Methods for Games and Recitation for GSND 5130	4
<b>Thesis</b>		
Students select Thesis or Capstone course in consultation with the program coordinator.		
GSND 6330 and GSND 6331	Player Experience and Recitation for GSND 6330	4
GSND 7990 or GSND 7980	Thesis Capstone	4

### Electives

Code	Title	Hours
<b>Game Design or Development</b>		
Complete one of the following:		
CS 5150	Game Artificial Intelligence	
CS 5850	Building Game Engines	
GSND 6000	Advanced Topics in Game Design	
GSND 6240	Exploratory Concept Design	
GSND 6250	Spatial and Temporal Design	

GSND 6460	Generative Game Design	
<b>Game User Research or Analytics</b>		
Complete one of the following:		4
CS 5340	Computer/Human Interaction	
GSND 6001	Advanced Topics in Game Science	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
GSND 6350	Data-Driven Player Modeling	
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Other Electives List</b>		
Complete any two of the previously listed courses or from the following (courses not listed below may be completed in consultation with your program coordinator).		8
If ARTG 5000 or GSND 6000 or GSND 6001 is completed more than once, the additional completions may be allowed toward the electives.		
Elective courses outside of CAMD are subject to availability and registration policy of the home college.		
ARTG 5000	Topics in Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5310	Visual Cognition	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
GSND 6000	Advanced Topics in Game Design	
GSND 6001	Advanced Topics in Game Science	
INSH 5302	Information Design and Visual Analytics	
JRNL 6341	Telling Your Story with Data	

## Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Sample Plan of Study

#### TWO YEARS, ONE (OPTIONAL) CO-OP

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
GSND 5110 and GSND 5111 and GSND 5112		5 Elective		4 Co-op (optional)	0
GSND 5130 and GSND 5131		4 Elective		4	
	9			8	0
Year 2					
Fall	Hours	Spring	Hours		
GSND 5122		1 GSND 7990 or 7980		4	
GSND 6330 and GSND 6331		4 Elective		4	
Elective		4			
	9			8	

Total Hours: 34

## Robotics, MS

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted (as of Spring 2025) to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

### Gordon Institute of Engineering Leadership

#### Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
ME 5250	Robot Mechanics and Control	4
ME 5659	Control Systems Engineering	
<b>Electrical and Computer Engineering</b>		
EECE 5550	Mobile Robotics	4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
CS 5180	Reinforcement Learning and Sequential Decision Making	4
CS 5335	Robotic Science and Systems	

#### Concentrations

Complete one of the following concentrations:

- Computer Science (p. 362)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 363)—College of Engineering
- Mechanical Engineering (p. 363)—College of Engineering

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

#### COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
<b>Required Course</b>		

Complete one additional CS course not used to fulfill the core requirements:

4

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 363)

16

*Project Option*

CS 8674	Master's Project
---------	------------------

4

Complete 12 semester hours of courses from the elective course list. (p. 363)

12

*Thesis Option*

CS 8674	Master's Project
---------	------------------

4

CS 7990	Thesis
---------	--------

4

Complete 8 semester hours of courses from the elective course list. (p. 363)

8

**ELECTRICAL AND COMPUTER ENGINEERING**

Code	Title	Hours
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Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

**Required Course**

Complete one additional EECE course not used to fulfill the core requirements:

4

EECE 5550	Mobile Robotics
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EECE 5552	Assistive Robotics
-----------	--------------------

EECE 5554	Robotics Sensing and Navigation
-----------	---------------------------------

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 363)

16

*Project Option*

EECE 7945	Master's Project
-----------	------------------

4

Complete 12 semester hours of courses from the elective course list. (p. 363)

12

*Thesis Option*

EECE 7945	Master's Project
-----------	------------------

4

EECE 7990	Thesis
-----------	--------

4

Complete 8 semester hours of courses from the elective course list. (p. 363)

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

**MECHANICAL ENGINEERING**

Code	Title	Hours
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Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

**Required Course**

Complete one additional ME course not used to fulfill the core requirements:

4

ME 5250	Robot Mechanics and Control
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ME 5659	Control Systems Engineering
---------	-----------------------------

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 363)

16

*Project Option*

ME 7945	Master's Project
---------	------------------

4

Complete 12 semester hours of courses from the elective course list. (p. 363)

12

*Thesis Option*

ME 7945	Master's Project
---------	------------------

4

ME 7990	Thesis
---------	--------

4

Complete 8 semester hours of courses from the elective course list. (p. 363)

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## **Elective Course List**

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 6250	Wearable Robotics	
ME 7247	Advanced Control Engineering	
PT 5170	Motor Control	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 7005	Experimental Design and Applied Statistics	
PT 7020	Technologies in Movement and Rehabilitation Science	

## Statistics, MS

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

### Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 366) (Bouvé College of Health Sciences)
- Statistical Machine Learning (p. 366) (Khoury College of Computer Sciences)
- Statistical Theory and Modeling (p. 366) (College of Science)

### Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		
MATH 6910	Master's Project	2
PHTH 6880	Statistical Consultancy	

**Co-op (Optional)**

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	0
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	0

**Program Credit/GPA Requirements**

31–32 total semester hours required

Minimum 3.000 GPA required

**BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)**

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Data Analytics, Graduate Certificate**

The interdisciplinary Graduate Certificate in Data Analytics is offered through a collaboration between the Khoury College of Computer Sciences and the College of Social Sciences and Humanities. The certificate curriculum emphasizes the skills needed to bridge between emerging technological capacities and traditional policymaking processes. The program is designed to provide students with foundational knowledge in data science—including data management, machine learning, data mining, statistics, and visualizing and communicating data—that can be applied to data-driven decision making in any discipline.

For more information on the certificate, refer to the program's website (<https://www.northeastern.edu/graduate/program/graduate-certificate-in-data-analytics-boston-14423/>).

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## College of Engineering

Website (<http://www.coe.neu.edu/academics/graduate-school-engineering/>)

**Gregory D. Abowd, PhD**, Dean

**Stefano Basagni, PhD**, Associate Dean for Global Engineering Campus

**Sagar Kamarthi, PhD**, Associate Dean for Graduate Education

**Mark Niedre, PhD**, Associate Dean for PhD Education

130 Snell Engineering Center

617.373.2711

The Graduate School of Engineering offers research and professional degree programs organized around a core curriculum that equips students with a solid foundation for technical and leadership positions in industry organizations, government laboratories, research laboratories, and educational institutions. By involving students in many levels of research, encouraging collaboration across departments, and partnering with outside institutions and organizations globally, Northeastern University engineering graduate students have the opportunity to gain a rich and experiential education in their chosen discipline.

Master of Science and doctoral degree programs are offered, as well as numerous graduate certificate programs that can be applied toward master's degree programs for lifelong learning. The GSE offers traditional full-time day and part-time evening master's and doctoral degree programs and part-time evening certificate programs. Programs are offered in Boston, Arlington, Miami, Seattle, Silicon Valley, Oakland, Portland (Maine), Toronto, and Vancouver. A number of courses and degree programs are also available in a flexible online or hybrid format, which are well suited for distance learners. Innovative programs, such as interdisciplinary degrees, business/entrepreneurship pathways, and programs for students without an undergraduate engineering degree (or who need additional preparatory coursework), enable students to personalize their learning experience.

## Academic Policies

- Academic Dismissal Policy (p. 403)
- Academic Integrity Policy (p. 403)
- Academic Standing Policy (p. 403)
- Appeals Policy (p. 404)
- Attendance Policy (p. 405)
- Certificate Policies and Procedures (p. 405)
- Course Registration (p. 406)
- Course Selection (p. 407)
- Dissertation Committee (p. 407)
- Grievance Policy (p. 408)
- PhD Student Progress and Review (p. 408)

- Program Completion (p. 409)
- Reenrollment Policy for Full-time Students (p. 409)
- Thesis Policy (p. 410)

## Academic Dismissal Policy

A student placed on academic probation for a cumulative grade-point average of less than 3.000 will have one academic term to raise the cumulative GPA greater than or equal to 3.000. Students whose cumulative GPA is below 3.000 for two consecutive terms in which they took courses for credit (including Career Management for Engineers (ENCP 6000) or Introduction to Cooperative Education (ENCP 6100), if taken) will automatically be dismissed from their degree program at the end of the second term. Students in this situation may submit an Academic Dismissal Appeal form to the graduate school, *to be reviewed by the student's academic department*, to request a final one-term extension. Students whose cumulative GPA is below 3.000 for three consecutive terms will automatically be dismissed from their degree program.

*A student will also be dismissed from their degree program if they do not meet the requirements of their program.*

A student who is dismissed from their program may submit an appeal through the college's graduate appeals process.

Students dismissed from their program will receive a written notification from the Graduate School of Engineering.

## Academic Integrity Policy

Graduate students are expected to abide by Northeastern University's Academic Integrity Policy (p. 155).

A faculty member who suspects that a graduate student has violated the university's Academic Integrity Policy must offer to meet with the student to discuss the suspected violation. The faculty member may ask the student to provide supporting documentation and may gather information from other students involved in the incident.

If the faculty member finds that the student has violated the Academic Integrity Policy, the faculty member may take action as the faculty member considers appropriate and can include adjusting the student's grade, requiring additional academic work, forfeiture of co-op opportunity, and/or failing the qualifying examination. In this case, the faculty member is encouraged to submit an information-only report about the incident to the university Office of Student Conduct and Conflict Resolution, which handles suspected violations of the Academic Integrity Policy. Any penalties must be imposed by the faculty member within three weeks of the suspected violation.

If the student is not satisfied with the faculty member's decision, the student may appeal to the department by contacting the department head (or designee) who should apply the department's procedures to review the case. If the suspected violation took place in a department or if it involved cooperative education, the appeal should be submitted to that unit. Otherwise, the appeal should be submitted directly to the college. The student should appeal within one week of the imposition of penalties.

The department will either affirm the faculty member's decision or substitute an alternative decision. The department's decision should be made within two weeks of receiving the appeal.

The student may appeal the department decision using the college's academic appeal process. The college will either affirm the department's decision or substitute an alternative decision.

The student may appeal the college decision using the university's academic appeal process.

The faculty member may appeal the department or college decision by submitting a complaint to OSCCR, which will determine whether the student is responsible for the suspected violation. OSCCR will make a recommendation to the senior vice provost for student affairs who will make a final decision.

If the student is found to be responsible for a violation by OSCCR, the faculty member may take action as appropriate. If the student is found to be not responsible for a violation, the faculty member cannot take action and if action was previously taken, the action must be reversed.

The dean (or designee) of the involved college shall take whatever action is necessary to implement the resolution of the case, including reporting a change of grade to the Office of the University Registrar.

## Academic Standing Policy

Academic standing at Northeastern University is determined by a student's cumulative grade-point average.

Academic probation is a period of time when a student must address and remediate academic deficiencies.

## Full-time Students

Full-time graduate students are expected to maintain a cumulative GPA of 3.000 or higher each term to remain in good academic standing and to progress toward graduation.

Students falling below a cumulative GPA of 3.000 are placed on academic probation for each academic term in which the cumulative GPA is below 3.000 after the completion of at least 8 semester hours. Full-time students must raise the cumulative GPA to 3.000 or higher after completion of at least 8 additional semester hours to regain good academic standing status.

## Part-time Students

Graduate students in official part-time status with the university are expected to maintain a cumulative GPA of 3.000 or higher each term to remain in good academic standing and to progress toward graduation.

Students falling below a cumulative GPA of 3.000 after at least 8 semester hours are completed are placed on academic probation. Part-time students must raise the cumulative GPA to 3.000 or higher after completion of at least 8 additional semester hours to regain good academic standing status.

## Summer Term

There are three semesters during the summer session: Summer 1, Summer 2, and Full Summer.

Academic standing for the summer terms will be reviewed and evaluated for all students at the end of the Summer 2 term. If students complete fewer than 8 semester hours during any of the summer semesters combined, their academic standing is evaluated after the completion of at least 8 semester hours.

## Appeals Policy

It is the policy of Northeastern University that all students shall be treated fairly with respect to evaluations made of their academic performance, standing, and progress. This policy provides an appeals mechanism to students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic determination.

The university presumes that academic judgments by its faculty are fair, consistent, and objective. Substitution of a different academic judgment for that of the original evaluator is a serious intrusion upon academic prerogatives entrusted to the faculty and others involved in academic evaluations.

This policy applies to appeals related to academic determinations in COE graduate courses, regardless of the student's home college, and graduate programs. Appeals related to graduate courses or programs offered by another college should be handled by that college. Appeals related to third-semester dismissals should be submitted directly to the college.

**Step 1.** The student should first speak with the involved faculty or staff member about any determination about which they have questions and attempt to reach a resolution.

**Step 2.** If the student is not satisfied with the decision, the student may appeal. If the appeal relates to a course or program offered by a department, the appeal should be submitted to that department. Otherwise, the appeal should be submitted directly to the college. Department appeals should be submitted to the department chair (or designee) who should apply the department's procedures to review the case. The student must appeal within four weeks of the academic determination.

A student shall initiate this appeal of an academic determination by submitting a written statement that specifies the details of the action or judgment that they seek to appeal. This statement must start with a clear description of the basis for the appeal and should include basic facts about the situation leading to the appeal, when the situation occurred, who was involved, and the resolution sought by the student. All relevant supporting materials should be attached as addenda to the statement. Appeals should avoid unsubstantiated, defamatory, or ad hominem accusations regarding the motivations of the faculty member or other persons involved in making the academic determination.

The department will either affirm the original decision or substitute an alternative decision. The department's decision shall be made in writing and include the reasoning behind the decision. The department's decision must be made within two weeks of receiving the appeal.

**Step 3.** The student may appeal the department's decision to the college. To initiate the college appeal, the student shall submit to the associate dean of graduate education their statement, the department's response, and any additional information the student would like to be considered. Appeals to the college are reviewed by the Graduate Appeals Committee, which makes recommendations to the associate dean for graduate education. The student shall be offered the opportunity to meet with the committee to make a statement, present relevant facts of the case, and respond to clarifying questions the committee may have regarding the case. The chair of the committee reserves the right to end this meeting after 10 minutes if no further relevant facts are forthcoming. The committee may invite faculty and staff members to discuss the case and share relevant information.

The committee will either affirm the original decision, substitute an alternative decision, or refer the case back to the department for additional consideration. The committee's decision shall be made in writing and include the reasoning behind the decision. The committee's decision must be made within two weeks of receiving the appeal.

**Step 4.** Upon receiving the recommendation of the committee, the associate dean for graduate education shall review the case and make a final decision for the college.

## Attendance Policy

In each term, students enrolled in on-ground sections are expected to be on campus and attending class beginning with the first day of classes. Students in online sections are expected to log in and participate in class beginning with the first day of classes.

Students who join a class after the first day of class during the university add period, or who are approved for late registration by the instructor and the Graduate School of Engineering, are responsible for all coursework missed prior to enrolling. Enrolled students who do not attend class during the first week of a semester risk being dropped from the course.

In the interest of students' success, the college does not support the arrival of students to class after the university add deadline. Students should not expect to be added to a class after the university add deadline and will be held responsible for the academic, financial, or immigration consequences due to their late or nonattendance without prior approval.

In cases where an enrolled student cannot arrive to campus by the first day of class due to circumstances beyond their control, it is the student's responsibility to contact the instructor for approval and notify the Graduate School of Engineering.

## Certificate Policies and Procedures

### Admission Into a Graduate School of Engineering Graduate Certificate

#### CURRENT GSE DEGREE-SEEKING STUDENTS

In order to be considered admissible to a College of Engineering graduate certificate, current GSE students:

1. Must be in good academic standing. Students on academic probation will not be admitted into a graduate certificate program.
2. **Must apply for admission to a certificate program in the fall or spring semester and prior to their final term of study. Requests for admission in the summer semesters or final term will not be considered, regardless of whether coursework has been completed.**
3. Current College of Engineering PhD students must also have the approval of their PhD faculty advisor.

#### NON-DEGREE-SEEKING STUDENTS

In order to be considered admissible to a College of Engineering graduate certificate, non-degree-seeking students must have:

1. A minimum 3.000 grade-point average.
2. Completed a relevant engineering undergraduate degree.
  - Applicants without an engineering undergraduate degree should apply to the Graduate Certificate in Technology Systems Management.

### Application Procedures

Apply via the Certificate Application for Current COE Graduate Students (<https://enroll.northeastern.edu/register/?id=ef6fb869-21a6-4e34-bc09-e830e53d13b4>). Graduate School of Engineering continuing students are not required to resubmit their admissions documents or pay the application fee. Contact the Graduate School of Engineering Admissions team ([coe-gradadmissions@northeastern.edu](mailto:coe-gradadmissions@northeastern.edu)) for questions about the application process.

### Academic Standing

All certificate-seeking students must meet the GSE requirement of a 3.000 GPA to remain in good standing. Only students who complete the required coursework and remain in good standing will be eligible to be awarded a certificate.

### GSE Certificate Policies

- Students must complete the certificate coursework before or in the same semester that they complete their primary degree coursework.

#### DOMESTIC STUDENTS

- May take courses on-ground at student's campus of study or online, provided the certificate is approved and offered at that campus.

#### INTERNATIONAL STUDENTS

- May take courses on-ground at student's campus of study, provided the certificate is approved and offered at that campus.
- During every required academic term, international students must maintain **full-time status and appropriate on-ground presence** at Northeastern University to comply with federal immigration regulations. International students must consult with the Office of Global Services (<https://international.northeastern.edu/ogs/>) to determine eligibility for enrollment in online courses.

### Certificate Coursework Credit Sharing with GSE Degrees

In approved circumstances, certificate coursework completed by graduate students may also be applied toward requirements of a College of Engineering graduate degree program. Two factors will be considered: course eligibility and the number of courses permitted to be applied to requirements of both the degree program and the certificate program (double counting).

## Course Eligibility

GSE certificate courses may be counted toward an engineering graduate degree if the **degree program** requirements allow for the course. Refer to the specific graduate degree requirements in the university catalog. Students cannot substitute any of the certificate courses, except by petition.

## Course Double Counting

For most **disciplinary degrees**, students can double count up to 8 semester hours of eligible courses for a graduate degree and graduate certificate. An exception is made for the following disciplinary degrees where students can double count up to 16 semester hours of eligible courses (with academic advisor approval for courses):

- All civil and environmental engineering programs (p. 441) pursuing the climate and engineering, and sustainability engineering certificates
- MSEnE Energy Systems (p. 568)
- MSEM Engineering Management (p. 564)
- MSIE Industrial Engineering (p. 560)
- MSOR Operations Research (p. 585)
- MSME Mechanical Engineering with concentration in General Mechanical Engineering (p. 572)

For all **multidisciplinary degree** (MGEN) programs: Students can double count up to 16 semester hours of eligible courses for a graduate degree and graduate certificate.

## Double Counting Across Certificates

Engineering graduate courses may not be double counted across graduate certificates.

## PlusOne Programs

Engineering graduate courses may not be triple counted for graduate certificate and/or degree programs. Graduate courses that are double counted toward the bachelor's and master's degrees (e.g., PlusOne programs) may not be counted toward a graduate certificate.

## Graduate Courses Applied to an Undergraduate Degree

Graduate courses that were applied toward an undergraduate degree cannot be double counted for a graduate certificate. Graduate courses completed as an undergraduate that are taken above and beyond the requirements for the undergraduate degree may count toward a graduate certificate.

## Co-op

Students enrolled in only a certificate program are not eligible to participate in co-op. Co-op eligibility will reside with the graduate degree program of the degree-seeking student. There are no additional considerations allotted by the certificate program.

## Applying to Graduate

Students must apply to graduate for their certificate when the application for graduation window opens or no later than the beginning of the term they plan to graduate. If graduating with both a certificate and a degree program, they must apply for the certificate first and then the degree program. Both the certificate and degree program will be awarded concurrently, even if the certificate coursework is completed before the degree coursework.

## Certificate Transcript

Awarding of a certificate will be noted on the official Northeastern University transcript of students who complete a certificate program.

### Course Registration

Full-time students (domestic and international) in the Graduate School of Engineering must register for classes on an ongoing basis and carry a minimum of 8 semester hours of coursework per semester. Any student who is appointed to a stipended graduate assistantship is considered full time for the term(s) of appointment if enrolled for a minimum of 6 semester hours.

All graduate students who are registered for Dissertation Term 1, Dissertation Term 2, Dissertation Continuation, PhD Candidacy Preparation, PhD Exam Preparation, or a 0-semester-hour Research course are considered full time. Registration in these courses is restricted to students who qualify for registration in these courses.

The graduate school does not require part-time students to be enrolled for a certain minimum number of semester hours in any term. However, part-time students who are not enrolled for more than one term (excluding summer terms) should take a leave of absence from Northeastern University to maintain active student status to keep their student account active.

The maximum number of semester hours approved for a student in each term varies by the degree program. However, a student can petition their faculty advisor to request permission to register for more than the allowed maximum number of semester hours for a given term. Normally, no more than 12 semester hours (inclusive of transfer credits and advanced standing for MS programs) may be taken outside the College of Engineering, unless otherwise specified in the program requirements.

Registration in classes is mandatory to maintain an active status with the university. Students must be registered in all courses for a given term prior to the university course add deadline. Students should not register for an excessive number of courses or for multiple sections of the same course with the intention of dropping half or more of the courses during the first week of classes.

Students must be registered in their last semester of study. International students should consult with the Office of Global Services (<https://international.northeastern.edu/ogs/>) if they are intending to complete their program during the summer semester. Domestic students finishing their requirements in the summer semester must be registered either in the full summer, summer 1, or summer 2 term.

Any student who is financially withdrawn by Student Accounts prior to the start of any given semester will not be permitted to register for that semester until they rectify the outstanding financial obligation.

The Graduate School of Engineering will correct registration errors. Corrections may generate a new tuition bill.

Due to last-minute scheduling changes, the Graduate School of Engineering must occasionally substitute faculty or change class schedules after the registration period has begun. Any student registered for the original course will automatically be registered for the updated section should no major schedule conflicts be apparent. Otherwise, the graduate school or the department will contact all affected students for alternatives.

Northeastern reserves the right to cancel, postpone, combine, or modify any class.

The Graduate School of Engineering does not allow College of Engineering graduate students to elect a pass/fail grading scheme for courses normally letter graded.

## Course Selection

Students should formulate a program of study in consultation with their assigned faculty advisor at the beginning of their program, during fall or spring orientation. Students should preselect courses whenever possible and plan to take them when offered, maintaining flexibility with alternate courses in mind. Courses other than the required courses are offered based on demand and are subject to faculty availability. Not all courses are offered every year; however, the graduate school will do everything possible to assure continuity of programs and permit students to make continuous progress toward earning their degrees.

## Prerequisite Courses/Undergraduate Courses

Students are not awarded credit toward graduate degree requirements for prerequisite courses unless expressly stated by the student's academic department. Students may occasionally be permitted by their advisor to take undergraduate courses. However, undergraduate courses do not count toward a graduate degree and may affect a student's eligibility to receive federal financial aid. Undergraduate courses do not count toward the graduate-level course load requirement for full-time students.

## Dissertation and Dissertation Continuation

Once program requirements are met for the PhD candidacy, PhD candidates must register for Dissertation Term 1 (XXXX 9990) and Dissertation Term 2 (XXXX 9991). Candidates must then register for Dissertation Continuation (XXXX 9996) in each subsequent semester (excluding the summer term) until the dissertation is complete and approved by the Graduate School of Engineering. Students completing their dissertation in the summer term must register for Dissertation Continuation. Dissertation and Dissertation Continuation confer full-time status.

## MS Thesis Option

Master's degree students who are completing a thesis must register for 4 semester hours of Master's Project (XXXX 7945) followed by 4 semester hours of Thesis (XXXX 7990) for a total of 8 semester hours. Students who have not completed their thesis but have already registered for the required number of thesis hours may register for Thesis Continuation in their last semester (including summer terms). There is a 1-semester-hour tuition charge for Thesis Continuation. Thesis Continuation may only be completed once.

## Petitions

Petitions are required in all cases where a student is requesting a change or exception to their current program or student status for the Graduate School of Engineering to maintain a complete and accurate record for all students.

## Dissertation Committee

A dissertation committee shall include a minimum of three members, or four members if there are two co-advisors. At least three committee members should hold a doctorate or an appropriate terminal degree for the discipline, and at least two shall be full-time Northeastern University faculty.

At least two committee members shall hold some appointment in the department that offers the degree that the student is seeking. At least one member of the committee must not have a primary appointment in the department that offers the degree that the student is seeking.

The chair of the dissertation committee, who is assumed to be the advisor, shall be a full-time tenured or tenure-track member of the faculty of Northeastern, shall hold some appointment in the department that offers the degree that the student is seeking, and will hold a doctorate or an appropriate terminal degree for the discipline.

Research and teaching faculty may serve as the chair of the dissertation committee with departmental approval. In this case, at least two members of the committee must be tenured or tenure-track full-time Northeastern faculty. Exceptions to this requirement may be granted by the dean (or designee) based on the qualifications and experience of the faculty member who would serve as chair.

## Graduate Student Grievance Policy

### Introduction

This policy describes steps a graduate student should follow to submit a grievance.

Students should first attempt to resolve an issue through informal means, for example, by communicating with appropriate faculty members or the program director. If the issue is not resolved, students should follow the steps described below.

Students who believe that they have been erroneously, capriciously, inappropriately, or otherwise unfairly treated in an academic or cooperative education determination should follow the appeals procedure described in the COE Graduate Appeals Policy or the COE Cooperative Education Appeals Policy, respectively. Subsequent academic appeals can be submitted by following the University Academic Appeals Policy and Procedure.

Northeastern University is committed to providing a living, learning, and work environment that is safe and free from discrimination and harassment. This includes all allegations of discrimination including those based on race, color, religion, religious creed, genetic information, sex (including pregnancy or pregnancy-related condition, sexual assault, sexual harassment, stalking, domestic violence), gender, gender identity, sexual orientation, age, national origin, ancestry, and veteran or disability status. If a student makes a claim of discriminatory acts prohibited by law or by university policy, the grievance shall first be pursued through the Office of University Equity and Compliance and its procedures. When this has been completed, any aspects of the grievance that remain unresolved may then be brought to the grievance procedure.

Graduate students can contact the Ombuds for Graduate Students that offers confidential, impartial, and informal assistance to graduate students who have concerns related to their university experience.

Note that the college prohibits retaliation against a student for filing a grievance.

### Grievance Procedure

A graduate student who would like to complain about their treatment by a College of Engineering employee (faculty or staff) may submit a grievance. A written description of the complaint should be submitted within 60 days of the alleged activity. The description should state the exact nature of the grievance, against whom it is filed, and the remedy sought.

The student should submit the complaint to the chair of the department that houses the student's primary program of study and to the associate dean for graduate education. The chair shall review the complaint, shall give any employees named in the grievance an opportunity to share relevant information, may gather additional information, and shall send a written response to the student and the associate dean for graduate education within two weeks.

If the student is not satisfied by the department chair's response, the student may submit the complaint to the associate dean for graduate education within two weeks. The associate dean shall review all available information and submit a written response to the student within two weeks.

If the student is not satisfied by the associate dean's decision, the student may submit the complaint to the dean within two weeks. The dean will review all available information and submit a written response to the student within two weeks.

## PhD Student Progress and Review

### Formal Requirements

The formal requirements for the PhD degree include the following milestones:

1. Completing required coursework.
2. Achieving candidacy, as determined by degree program. May be achieved through qualifying examinations, comprehensive examination(s), and/or an oral defense of the dissertation proposal.
3. Identifying a faculty research advisor.
4. Forming a dissertation committee.
5. Writing and completing a successful oral defense of the dissertation proposal before the PhD committee.
6. Completing a successful oral defense of dissertation before the PhD committee.
7. Approval of written dissertation by dissertation committee and Graduate School of Engineering.

### Time Limits

Departments shall define standards for satisfactory performance progress for PhD students that include the following time limits:

**DIRECT-ENTRY PHD STUDENTS**

1. Candidacy must be achieved within three years of entering the PhD program.
2. The degree must be completed within seven years of entering the PhD program.

**ADVANCED-ENTRY PHD STUDENTS**

1. Candidacy must be achieved within three years of entering the PhD program.
2. The degree must be completed within five years of entering the PhD program.

**Performance Progress**

Departments shall establish a review process by which the performance progress of every PhD student is evaluated not more than once per semester and at least annually. As part of this review, students should submit information **that must include achievement of milestones** and could include descriptions of their plans, achievements, progress toward goals, transcripts, CV, publications, conferences attended, recognition they have received, and awards. The review process must include feedback from the student's faculty advisor.

If a department finds that a PhD student is not making satisfactory progress, the student shall be placed on performance probation. Members of the department shall work with the student to develop a performance improvement plan that includes specific actions the student should take to return to satisfactory progress. The performance progress of each PhD student on performance probation shall be reviewed by their department no earlier than one semester and no later than one year after being placed on probation. If a student on performance probation is again found to be not making satisfactory progress, the student shall be dismissed from their degree program. If a student on performance probation is found to be making satisfactory progress, the student shall leave performance probation status.

A copy of the performance progress review and performance improvement plan, if applicable, shall be submitted to the student. For all students, the result of the performance progress review shall be submitted to the Graduate School of Engineering. For all students who receive an unsatisfactory review, a summary of the performance progress review and performance improvement plan shall be submitted to the Graduate School of Engineering. Students dismissed from their program will be notified by the Graduate School of Engineering. A student who is dismissed from their program may submit an appeal through the college's graduate appeals process.

For the purposes of determining the timing of performance reviews specified by this policy, the summer 1 and summer 2 semesters shall collectively be considered one semester.

**Program Completion**

In order to earn a degree in the graduate program in which a student is enrolled, a student must complete all program and departmental requirements in a satisfactory manner.

A student must attain a cumulative grade-point average of 3.000 or higher in all courses applied toward that degree. A student must also earn a grade of C or higher in all required core courses. Please note that individual programs may have additional requirements.

**Reenrollment Policy for Full-time Students**

Students who enroll and complete at least one graduate engineering course can apply to their academic department to take an official leave of absence from the time they complete said course(s) and be automatically readmitted without department review. Automatic readmission applies only to the original program and concentration (if applicable) and only for students who took an official approved leave of absence. Catalog year of entry does not change and students must complete the curriculum requirements outlined in the Northeastern University *Graduate Catalog* for their original academic year of admission.

If a student without official leave of absence approval does not enroll in classes for two consecutive fall/spring semesters, they will be declared inactive. To return from inactive status, a student must submit an updated application to refresh their student record, and this application will be approved provided the student was in good standing at the time their absence started.

If a student without official leave of absence approval does not enroll in classes for three consecutive fall/spring semesters, or does not indicate their intent in writing to the Graduate School of Engineering by the end of the third consecutive semester, they will be withdrawn from the program. In the case of withdrawal, a student will be required to submit a new admission application for graduate studies without guarantee of readmission. If the student is admitted after being withdrawn, they will be admitted into the current catalog year and must meet the curriculum requirements in the current *Graduate Catalog*.

In cases where the student has seven or more years of nonenrollment, the graduate advisor in the Graduate School of Engineering shall initiate the process by contacting the graduate studies chair/program director on behalf of the student to confirm the content in the course(s) is still relevant to the current degree program. If the courses are confirmed to still be relevant, the graduate advisor shall submit a Waiver Request form with a copy of the course confirmation, the student's academic transcript, and any additional supporting documents to the graduate studies chair/program director and associate dean for graduate education for review and final approval. If the waiver is approved, the graduate advisor will send the waiver to the Office of the University Registrar for the course(s) to be applied to the student's degree audit.

## Thesis Policy

This policy applies to all full-time and part-time graduate students pursuing a master's degree program or students in the PlusOne accelerated master's degree program in the College of Engineering.

Students that pursue the thesis option in a master's degree will enroll in 4 semester hours of Master's Project followed by 4 semester hours of Thesis.

If a student is unable to complete the thesis requirements after registering for the Thesis course (7990), they should consult their academic advisor to determine the appropriate course for the following term to maintain their registration status while completing the thesis requirements.

In addition to completing the Master's Project and Thesis courses, students must successfully complete the thesis submission process by the specified deadlines, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

Students pursuing the thesis option may switch to a Master's Project or coursework-only option after completing the Master's Project course. If a student changes from the thesis option to Master's Project, no action is needed. If a student changes from the thesis option to coursework option, they may petition to count up to 4 semester hours of Master's Project as elective credit toward the coursework option. This petition will be reviewed by the program contact, who may verify the work with the thesis advisor. If the program determines that the Master's Project semester hours cannot count toward the new coursework option requirements, students may need to take additional courses at their own expense to meet the degree requirements.

## Bioengineering

Website (<https://bioe.northeastern.edu/>)

**Abraham Joy, PhD**  
 Professor and Chair  
 206 Interdisciplinary Science and Engineering Complex  
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The Department of Bioengineering is driven by the conviction that the interface of engineering and medicine will be one of the great intellectual adventures of the 21st century. To prepare students for this adventure, the department strives to create an atmosphere of innovation and creativity that fosters excellence in instruction and research and provides a foundation for programs that drive forward the cutting edge of knowledge while establishing translational collaborations with clinical and industrial researchers.

Bioengineering is a relatively new field built on the recognition that engineering of biological systems or systems that interface with living systems requires a multidisciplinary approach that considers the mechanical, electrical, chemical, and materials properties of the biological system. Students with backgrounds from biochemistry to computer science and many fields in between are attracted to bioengineering as a field with the potential to make a great impact on human health. The MS and PhD programs are designed to integrate students with very different backgrounds and provide them with the coursework and research experience that will take advantage of their unique backgrounds and, where appropriate, fill in gaps in their backgrounds to help them grow into a more broadly informed student.

Recognizing the breadth of disciplines that contribute to bioengineering projects, the MS program allows students to choose one of four concentrations (biomechanics and mechanobiology; biomedical devices and bioimaging; molecular, cell, and tissue engineering; or systems, synthetic, and computational bioengineering) to develop deep expertise in an area of particular interest and encourages individual research through a one-semester master's project, or a master's project followed by a master's thesis.

The PhD program spans four core research areas for which the department has particular strengths: biomechanics and mechanobiology; biomedical devices and bioimaging; molecular, cell, and tissue engineering; and systems, synthetic, and computational bioengineering. Coursework is designed to strengthen student backgrounds in those areas most relevant to the interests of each student.

## Mission of the Department

The mission of the Department of Bioengineering is the education of students in the fundamental principles and practice of bioengineering and, through basic and applied research, the creation of new knowledge at the interface of engineering and medicine to support development of new technologies for improvement of human health and healthcare.

## Overview of Programs Offered

The Department of Bioengineering offers a Master of Science and a Doctor of Philosophy in Bioengineering. The MS degree is offered as a full-time or part-time program. The PhD degree program is only offered as a full-time program.

Candidates pursuing an MS or PhD are able to select thesis topics from a diverse range of faculty research. New graduate students may learn about ongoing research topics from individual faculty members, faculty websites, and bioengineering seminars.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1127) in combination with the MS degree.

## Programs

### Doctor of Philosophy (PhD)

- Bioengineering (p. 411)
- Interdisciplinary Engineering (p. 418)

### Master of Science in Bioengineering (MSBioE)

- Bioengineering (p. 421)

## Bioengineering, PhD

Biology can inspire engineering. Increasingly, discoveries in the life sciences reveal processes, complexity, and control without analogy in the world of traditional engineering. Current methods of producing nanoscale control over molecules cannot reproduce the organization found in even the simplest organisms. Energy capture, robust control, remediation, and self-assembly are all employed by biosystems with efficiency unparalleled by anything in today's laboratories. At the same time, traditional engineering disciplines struggle to find new approaches to the complex challenges of 21st-century technology. The last 50 years of basic life science research have gradually revealed the layers of complexity intrinsic to biological processes, unmasking the fundamental underpinnings on which biological systems are constructed. Bioinspired engineering has the potential to transform the technological landscape of the 21st century. Astonishingly, it represents merely one of the myriad opportunities presented at the interface of biology and engineering.

The field of bioengineering is broad and includes all research at the interface of engineering and biology—this includes bioprocesses, environmental microbiology, biomaterials and tissue engineering, bioelectricity, biomechanics, biomedical and biological imaging, nanotechnology in medicine and the environment, and engineering design for human interfacing. At Northeastern University, bioengineering PhD students have an opportunity to be trained to appreciate advances in bioengineering across a wide range of disciplines while they perform highly focused and cutting-edge bioengineering research with one of our faculty members.

The interdisciplinary PhD in Bioengineering program reflects departmental research strengths in multiple areas. Students accepted to the bioengineering program will undertake a rigorous core curriculum in basic bioengineering science, followed by a flexible selection of electives tailored to their dissertation research.

## Research Areas

There are four key areas of research strength in our department.

### AREA 1—BIOMEDICAL DEVICES AND BIOIMAGING

The Biomedical Devices and Bioimaging track reflects Northeastern's outstanding research profile in developing transformative and translational instrumentation and algorithms to help understand biological processes and disease. Our department has active federally funded research spanning across a broad spectrum of relevant areas in instrument design, contrast agent development, and advanced computational modeling and reconstruction methods. Example research centers and laboratories include theInstitute for Chemical Imaging of Living Systems (<https://coe.northeastern.edu/coe-research/research-centers-institutes/institute-for-chemical-imaging-of-living-systems/>), theTranslational Biophotonics Cluster (<https://sites.google.com/view/tbpclusternu/home/>), and theB-SPIRAL signal processing group (<https://web.northeastern.edu/spiral/>).

### AREA 2—BIOMECHANICS AND MECHANOBIOLOGY

Motion, deformation, and flow of biological systems in response to applied loads elicit biological responses at the molecular and cellular levels that support the physiological function of tissues and organs and drive their adaptation and remodeling. To study these complex interactions, principles of solid, fluid, and transport mechanics must be combined with measures of biological function. The Biomechanics and Mechanobiology track embraces this approach and leverages the strong expertise of Northeastern faculty attempting to tie applied loads to biological responses at multiple length and time scales.

### AREA 3—MOLECULAR, CELL, AND TISSUE ENGINEERING

Principles for engineering living cells and tissues are essential to address many of the most significant biomedical challenges facing our society today. These application areas include engineering biomaterials to coax and enable stem cells to form functional tissue or to heal damaged tissue; designing vehicles for delivering genes and therapeutics to reach specific target cells to treat a disease; and uncovering therapeutic strategies to curb pathological cell behaviors and tissue phenotypes. At a more fundamental level, the field is at the nascent stages of understanding how cells make decisions in complex microenvironments and how cells interact with each other and their surrounding environment to organize into complex three-dimensional tissues. Advances will require multiscale experimental, computational, and theoretical approaches spanning molecular-cellular-tissue levels and integration of molecular and physical mechanisms, including the role of mechanical forces.

## AREA 4—SYSTEMS, SYNTHETIC, AND COMPUTATIONAL BIOENGINEERING

Research groups in systems, synthetic, and computational bioengineering apply engineering principles to model and understand complex biological systems, including differentiation and development, pathogenesis and cancer, and learning and behavior. This involves designing and implementing methods for procuring quantitative and sometimes very large datasets, as well as developing theoretical models and computational tools for interpreting these data. Deciphering the workings of a biological system allows us to identify potential biomarkers and drug targets, to develop protocols for personalized medicine, and more. In addition, we use the design principles of biological systems we discover to engineer and refine new synthetic biological systems for clinical, agricultural, environmental, and energy applications.

## Degree Requirements

Completion of the PhD degree requires students to successfully complete the following requirements:

### CURRICULUM

The curriculum comprises a strong core of fundamental courses that is coupled with flexible choices of restricted and unrestricted technical electives to provide depth in a particular field of study. The detailed course requirements are outlined below.

For students possessing a baccalaureate in a suitable quantitative or technical field before entering the PhD program, the required course distribution is shown in the table below:

Requirements	Credits
Required core courses	12
Restricted technical electives	8
Unrestricted technical electives	12
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	32

The curriculum for PhD students with “advanced standings,” i.e., students with an MS degree in relevant engineering areas awarded at a qualified institution, will be selected from the available core and elective courses under the guidance of the program director and the student’s primary advisor. Completion of the PhD degree with an advanced standing requires a minimum of 16 semester hours of coursework to be approved by the graduate director and a completed PhD dissertation.

Requirements	Credits
Required core courses	8
Advisor-approved coursework	8
Advanced seminar (four semesters)	
Dissertation	
Minimum semester hours required	16

### QUALIFYING EXAM (WRITTEN AND ORAL)

To qualify to continue in the PhD program, students must pass the bioengineering qualifying examination in the most relevant of the four department research areas. Students will prepare a seven-page written document that will be distributed to the committee before the oral examination. Details of the formal qualification exam procedure and timing are available in the Graduate Handbook (<https://bioe.northeastern.edu/community/resources-for-current-students/>). In addition, satisfactory research progress and academic standing are required to pass the exam. The qualifying exam is normally taken in the student’s second year.

### QUALIFYING EXAM COMMITTEE

The qualifying examination committee is composed of three members of the Department of Bioengineering faculty. At least two of three committee members will be from the student’s research area. The student’s primary research advisor may not sit on the qualifying exam committee.

### PHD DISSERTATION COMMITTEE

Students normally form their dissertation committee within two years of joining the PhD program. The dissertation committee is composed of a minimum of three members, two of whom must be core faculty from the Department of Bioengineering. The student’s primary advisor will be a member of and chair the dissertation committee. This advisor must be a member of the core bioengineering faculty or a faculty member from another department who has an affiliation with the bioengineering department. Students are required to meet annually with their PhD dissertation committee to ensure satisfactory research progress.

### ANNUAL COMMITTEE MEETINGS AND DISSERTATION PROPOSALS

PhD students must hold their first committee meetings no later than their third year. The first committee meeting requires the student to write a dissertation proposal in the form of an NIH-style R21 proposal research plan that will be distributed to their dissertation committee at least one week prior to the meeting. Thereafter, students are expected to hold annual progress updates with their committee. At the penultimate committee meeting (which must be held at least four months prior to the dissertation defense), the student will prepare and present a final proposal document to the committee. Successful defense of this proposal will allow the student to progress to the PhD dissertation defense.

## PHD DISSERTATION DEFENSE

PhD candidates must satisfactorily complete and defend a dissertation describing original research in bioengineering in an open presentation to the Northeastern bioengineering community, followed by a closed meeting with their dissertation committee in which they are expected to defend their work and answer all relevant questions regarding that work, its significance, and its relationship to ongoing work across the broader research community.

## DISSERTATION COURSE REQUIREMENTS

After achieving PhD candidacy by passing the qualifying exam, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (BIOE 9996) every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed. Students may not register for Dissertation Continuation (BIOE 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (BIOE 9990) and Dissertation Term 2 (BIOE 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Exam Preparation—Doctoral (BIOE 8960) in a section for which their research or academic advisor is listed as the instructor in the online registration system.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying examination (within two years of entry)  
Dissertation committee  
Annual committee meetings  
Area examination (dissertation prospectus/proposal)  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Seminar</b>		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
<b>Required Core</b>		
BIOE 6100	Medical Physiology	4
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
<b>Restricted Bioengineering Technical Electives</b>		
Complete 8 semester hours from the following:		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	

BIOE 5710	Experimental Systems and Synthetic Bioengineering
BIOE 5720	Physical Bioengineering
BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5810	Design of Biomedical Instrumentation
BIOE 5820	Biomaterials
ME 5665	Musculoskeletal Biomechanics

**Technical Electives**

Complete 12 semester hours from the electives listed below.

12

**Electives Course List**

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	
BIOE 5060	Special Topics in Bioengineering	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
BIOE 5710	Experimental Systems and Synthetic Bioengineering	
BIOE 5720	Physical Bioengineering	
BIOE 5750	Modeling and Inference in Bioengineering	
BIOE 5760	Method and Logic in Systems Biology and Bioengineering	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
BIOE 5850	Design of Implants	
BIOE 5860	Engineering Approaches to Precision Medicine I	
BIOE 5870	Engineering Approaches to Precision Medicine II	
BIOE 5880	Computational Methods in Systems Bioengineering	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
CAEP 6202	Research, Evaluation, and Data Analysis	
CHEM 5612	Principles of Mass Spectrometry	
CHEM 5620	Protein Chemistry	
CHEM 5621	Principles of Chemical Biology	
CHEM 5638	Molecular Modeling	
CHME 5630	Biochemical Engineering	
CHME 5632	Advanced Topics in Biomaterials	

CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7238	Finite Element Method 2
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 5116	Network Science 1
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Biological Physics 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism

PMST 6254	Advanced Drug Delivery Systems
PT 5138	Neuroscience
PT 5139	Lab for PT 5138
PT 5150	Motor Control, Development, and Learning
PT 5151	Lab for PT 5150

## Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review

Qualifying examination (within two years of entry)

Dissertation committee

Area examination (dissertation prospectus/proposal)

Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Seminar</b>		
BIOE 7390	Seminar (Register and complete two semesters)	0
BIOE 7391	Student Seminar (Register and complete once in second year and once in fourth year)	0
<b>Required Core</b>		
BIOE 6200	Mathematical Methods in Bioengineering	4
BIOE 7000	Principles of Bioengineering	4
<b>Approved Coursework</b>		
Complete 8 semester hours from the electives listed below.		8

## Electives Course List

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	
BIOE 5060	Special Topics in Bioengineering	
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5235	Biomedical Imaging	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5410	Molecular Bioengineering	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5648	Biomedical Optics	

BIOE 5650	Multiscale Biomechanics
BIOE 5660	Integrative Mechanobiology
BIOE 5710	Experimental Systems and Synthetic Bioengineering
BIOE 5720	Physical Bioengineering
BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5760	Method and Logic in Systems Biology and Bioengineering
BIOE 5800	Systems, Signals, and Controls for Bioengineers
BIOE 5810	Design of Biomedical Instrumentation
BIOE 5820	Biomaterials
BIOE 5850	Design of Implants
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOE 5870	Engineering Approaches to Precision Medicine II
BIOE 5880	Computational Methods in Systems Bioengineering
BIOE 6100	Medical Physiology
BIOL 5543	Stem Cells and Regeneration
BIOL 5601	Multidisciplinary Approaches in Motor Control
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
CAEP 6202	Research, Evaluation, and Data Analysis
CHEM 5620	Protein Chemistry
CHEM 5621	Principles of Chemical Biology
CHEM 5638	Molecular Modeling
CHME 5630	Biochemical Engineering
CHME 5632	Advanced Topics in Biomaterials
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5310	Computer Graphics
CS 5330	Pattern Recognition and Computer Vision
CS 5335	Robotic Science and Systems
CS 5400	Principles of Programming Language
CS 5600	Computer Systems
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6410	Compilers
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
EECE 5606	Micro- and Nanofabrication
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7271	Computational Methods in Electromagnetics
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7352	Computer Architecture
EECE 7353	VLSI Design

EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
IE 7315	Human Factors Engineering
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 7238	Finite Element Method 2
ME 7275	Essentials of Fluid Dynamics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
OR 6205	Deterministic Operations Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 5116	Network Science 1
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7321	Computational Physics
PHYS 7741	Biological Physics 2
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
PT 5138	Neuroscience
PT 5139	Lab for PT 5138
PT 5150	Motor Control, Development, and Learning
PT 5151	Lab for PT 5150

## Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Interdisciplinary Engineering, PhD

130 Snell Engineering Center  
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

## Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 410)
- Department of Chemical Engineering (p. 425)
- Department of Civil and Environmental Engineering (p. 440)
- Department of Electrical and Computer Engineering (p. 469)
- Department of Mechanical and Industrial Engineering (p. 531)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary engineering PhD requires the commitment by a faculty member at Northeastern to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

## Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

## Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

## Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

## Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Direct Entry

Complete all requirements listed below unless otherwise indicated.

## Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
Annual review  
Dissertation committee formation  
Dissertation proposal

Dissertation defense

**Requirements**

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		

**Dissertation**

Code	Title	Hours
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991 or CHME 9991 or CIVE 9991 or EECE 9991 or IE 9991 or ME 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.000 GPA required

**Advanced Entry Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Advanced Entry**

Complete all requirements listed below unless otherwise indicated.

**Milestones**

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

**Requirements**

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		

**Dissertation**

Code	Title	Hours
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	

or CHME 9991	Dissertation Term 2
or CIVE 9991	Dissertation Term 2
or EECE 9991	Dissertation Term 2
or IE 9991	Dissertation Term 2
or ME 9991	Dissertation Term 2

## Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

### Bioengineering, MSBioE

Bioengineering is engineering in a biological context such as the human body, an ecosystem, or a bioreactor. In every case, the interface between engineered and biological systems places unique constraints on the design and implementation of devices, instruments, or implants. These depend on the properties of the biological system involved and the functionality that is being created.

The interface of engineering and medicine as embodied in bioengineering will be one of the most exciting endeavors and greatest adventures of the 21st century. Job opportunities are expected to expand dramatically with a focus on development of entirely new classes of products, instrumentation, and implants. The impact to human health will be extraordinary.

Bioengineering is intrinsically multidisciplinary and it is essential that students learn the languages used by multidisciplinary teams. To that end, our curriculum is structured around a core of six courses that analyze biological systems from every possible quantitative point of view. On the completion of the core, students select one of four concentrations, which provides the opportunity to develop a deep level of expertise in a specific area of bioengineering.

Bioengineering students will have unique opportunities in the classroom, research labs, and experiential learning. The projects that they may be able to contribute to include bio-bandages that monitor bacterial growth or that help damaged ligaments heal faster; sheets of cells folded like origami to form a working kidney; and new materials that—like a leaf in the sun—automatically sense and adapt to changes in the environment.

Our graduate program includes four concentrations, including:

- Biomechanics and Mechanobiology
- Biomedical Devices and Bioimaging
- Molecular, Cell, and Tissue Engineering
- Systems, Synthetic, and Computational Bioengineering

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Bioengineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Bioengineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 33-semester-hour degree and certificate will require 17 hours of advisor-approved bioengineering technical courses.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Note:** This major requires a concentration: biomechanics and mechanobiology; biomedical devices and bioimaging; molecular, cell, and tissue engineering; or systems, synthetic, and computational bioengineering. Consult your college administrator.

## Core Requirements

Code	Title	Hours
<b>Seminar</b>		
BIOE 7390	Seminar <sup>1</sup>	0
<b>Required Core</b>		
A grade of C or higher is required in each course:		
BIOE 6000	Principles of Bioengineering <sup>1</sup>	1
BIOE 6100	Medical Physiology	4

## Concentrations

Complete one of the following four concentrations:

- Biomechanics and Mechanobiology (p. 422)
- Biomedical Devices and Bioimaging (p. 423)
- Molecular, Cell, and Tissue Engineering (p. 424)
- Systems, Synthetic, and Computational Bioengineering (p. 424)

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Principles of Bioengineering (BIOE 6000) and Seminar (BIOE 7390) are not required for students in a PlusOne bioengineering pathway, but students must successfully complete a total of 32 semester hours.

## BIOMECHANICS AND MECHANOBIOLOGY CONCENTRATION

Code	Title	Hours
<b>Required Coursework</b>		
A grade of C or higher is required.		
Complete two of the following:		8
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
ME 5665	Musculoskeletal Biomechanics	
<b>Coursework Option</b>		
Complete 20 semester hours from the course list.		20
<b>Project Option</b>		
BIOE 7945	Master's Project	4
Complete 16 semester hours from the course list.		16
<b>Thesis Option</b>		
Complete the following:		8
BIOE 7945	Master's Project	
BIOE 7990	Thesis	
Complete 12 semester hours from the course list.		12
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
<b>Course List</b>		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5630	Physiological Fluid Mechanics	
BIOE 5640	Computational Biomechanics	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	

BIOE 5820 or CHME 5631	Biomaterials Biomaterials Principles and Applications
BIOL 5601	Multidisciplinary Approaches in Motor Control
CHME 5632	Advanced Topics in Biomaterials
EECE 7200	Linear Systems Analysis
EECE 7203	Complex Variable Theory and Differential Equations
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 7238	Finite Element Method 2

**BIOMEDICAL DEVICES AND BIOIMAGING CONCENTRATION**

Code	Title	Hours
<b>Required Coursework</b>		
A grade of C or higher is required:		
BIOE 5235 or BIOE 5648	Biomedical Imaging Biomedical Optics	4
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	4
BIOE 5810	Design of Biomedical Instrumentation	4
<b>Coursework Option</b>		
Complete 16 semester hours from the course list.		
<b>Project Option</b>		
BIOE 7945	Master's Project	4
Complete 12 semester hours from the course list.		
<b>Thesis Option</b>		
Complete the following:		
BIOE 7945	Master's Project	8
BIOE 7990	Thesis	
Complete 8 semester hours from the course list.		
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
<b>Course List</b>		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5648	Biomedical Optics	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5820 or CHME 5631	Biomaterials Biomaterials Principles and Applications	
BIOE 5850	Design of Implants	
CHME 5632	Advanced Topics in Biomaterials	
EECE 5606	Micro- and Nanofabrication	
EECE 7105	Optics for Engineers	
EECE 7200	Linear Systems Analysis	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7204	Applied Probability and Stochastic Processes	
ME 5657	Finite Element Method 1	
NNMD 5370	Nanomedicine Research Techniques	

**MOLECULAR, CELL, AND TISSUE ENGINEERING CONCENTRATION**

Code	Title	Hours
<b>Required Coursework</b>		
A grade of C or higher is required:		
BIOE 5410 or BIOE 5411	Molecular Bioengineering Applied Molecular Bioengineering	4
BIOE 5420	Cellular Engineering	4
<b>Coursework Option</b>		
Complete 19–20 semester hours from the course list.		19-20
<b>Project Option</b>		
BIOE 7945	Master's Project	4
Complete 15–16 semester hours from the course list.		15-16
<b>Thesis Option</b>		
Complete the following:		8
BIOE 7945	Master's Project	
BIOE 7990	Thesis	
Complete 11–12 semester hours from the course list.		11-12
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		
<b>Course List</b>		
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5411	Applied Molecular Bioengineering	
BIOE 5430	Principles and Applications of Tissue Engineering	
BIOE 5440	The Cell as a Machine	
BIOE 5450	Stem Cell Engineering	
BIOE 5510	Bioengineering Products/Technology Commercialization	
BIOE 5650	Multiscale Biomechanics	
BIOE 5660	Integrative Mechanobiology	
BIOE 5710	Experimental Systems and Synthetic Bioengineering	
BIOE 5720	Physical Bioengineering	
BIOE 5820 or CHME 5631	Biomaterials Biomaterials Principles and Applications	
BIOL 5543	Stem Cells and Regeneration	
BIOL 6301	Molecular Cell Biology	
CHME 5632	Advanced Topics in Biomaterials	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	

**SYSTEMS, SYNTHETIC, AND COMPUTATIONAL BIOENGINEERING CONCENTRATION**

Code	Title	Hours
<b>Required Coursework</b>		
A grade of C or higher is required.		
BIOE 5710	Experimental Systems and Synthetic Bioengineering	4
BIOE 5720	Physical Bioengineering	4
Complete one of the following courses:		4
BIOE 5115	Dynamical Systems in Biological Engineering	
BIOE 5750	Modeling and Inference in Bioengineering	
<b>Coursework Option</b>		
Complete 16 semester hours from the course list.		16
<b>Project Option</b>		
BIOE 7945	Master's Project	4
Complete 12 semester hours from the course list.		12
<b>Thesis Option</b>		

Complete the following:

8

BIOE 7945	Master's Project
BIOE 7990	Thesis

Complete 8 semester hours from the course list.

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

#### Course List

BINF 6400	Genomics in Bioinformatics
BIOE 5115	Dynamical Systems in Biological Engineering
BIOE 5440	The Cell as a Machine
BIOE 5510	Bioengineering Products/Technology Commercialization
BIOE 5640	Computational Biomechanics
BIOE 5750	Modeling and Inference in Bioengineering
BIOE 5760	Method and Logic in Systems Biology and Bioengineering
BIOE 5860	Engineering Approaches to Precision Medicine I
BIOE 5870	Engineering Approaches to Precision Medicine II
BIOE 5880	Computational Methods in Systems Bioengineering
BIOL 6299	Molecular Cell Biology for Biotechnology
CHEM 5638	Molecular Modeling
CHME 5630	Biochemical Engineering
DS 5110	Introduction to Data Management and Processing
DS 5220	Supervised Machine Learning and Learning Theory
DS 5230	Unsupervised Machine Learning and Data Mining
HINF 5101	Introduction to Health Informatics and Health Information Systems
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 5202	Introduction to Epidemiology
PHYS 5116	Network Science 1

- <sup>1</sup> Principles of Bioengineering (BIOE 6000) and Seminar (BIOE 7390) are not required for students in a PlusOne bioengineering pathway, but students must successfully complete a total of 32 semester hours.

## Chemical Engineering

Website (<http://www.che.neu.edu>)

**Rebecca Kuntz Willits, PhD**  
Professor and Chairperson

201 Cullinane  
617.373.2989  
617.373.2209 (fax)

### Mission of the Department

The mission of the Department of Chemical Engineering at Northeastern University is to educate and train students in chemical engineering practice through integrating an inclusive classroom environment with hands-on and cooperative education experiences while solving research problems that impact our world.

Co-op enables students to integrate practical workplace knowledge with classroom learning so the educational experiences are synergistic and deepen the learning process. The chemical engineering community encourages professional development through active participation and leadership in student organizations, professional societies, and departmental activities.

The graduate programs in the Department of Chemical Engineering offer students the opportunity to work on cutting-edge research that tackles pressing challenges facing our society and our planet in areas such as biomedicine, energy, security, and sustainability. Students develop an in-depth understanding of the principles of chemical engineering through core coursework and applied electives, while gaining career experience through laboratory research or co-op. The overarching goal of the rich research and educational experience is to mentor and to equip our students to become future leaders in engineering and science, while simultaneously promoting scholarly achievement for both the faculty and students.

## Academic Programs

The department offers graduate programs in both chemical engineering and pharmaceutical engineering:

- MS in Chemical Engineering
  - MS in Chemical Engineering students can select a concentration that is focused either on sustainability, biosystems, or development of research skills.
- MS in Pharmaceutical Engineering
- PhD in Chemical Engineering
- PhD in Interdisciplinary Engineering

Many graduate-level courses are in the late afternoon or early evening to make them accessible to part-time students with full-time industrial careers. A full-time student may apply for participation in the co-op plan. MS or PhD students pursuing research should first gain the consent of their advisor(s) prior to participating in the co-op plan. Any deviations from the curriculum must be addressed by petition to the graduate committee and will be considered on a case-by-case basis.

Graduate students pursuing a thesis MS or a PhD degree are able to select research topics from a diverse range of faculty interests. The department's research areas include biomolecular and biomedical systems, complex and computational systems, energy and sustainability, engineering education and pedagogy, and materials and nanotechnology. New graduate students can learn about ongoing research from individual faculty members, faculty websites, and graduate student seminars. Graduate student seminars are held on a regular basis and provide an interactive forum for learning and exchanging research ideas.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with their degree. Students should consult their faculty advisor regarding these options (p. 625).

### GRADUATE CERTIFICATE IN PROCESS SAFETY ENGINEERING

The Process Safety Engineering Graduate Certificate program focuses on the integration of chemical engineering skills with the knowledge of process safety and regulation with specific attention on designing and developing solutions for industrial firms with the goal of creating environments that are safer and in compliance with regulatory rules and regulations.

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1127) in combination with the MS degree.

## Programs

### Doctor of Philosophy (PhD)

- Chemical Engineering (p. 426)
- Interdisciplinary Engineering (p. 418)

### Master of Science (MS)

- Pharmaceutical Engineering (p. 433)

### Master of Science in Chemical Engineering (MSChE)

- Chemical Engineering (p. 435)

### Graduate Certificate

- Process Safety Engineering (p. 440)

## Chemical Engineering, PhD

Each student admitted to the PhD program in chemical engineering will initially be designated a doctoral student. Upon successful completion of the requirements for doctoral candidacy as described below, a student is reclassified as a doctoral candidate. After establishing candidacy, a student must complete a dissertation under the direction of a dissertation advisor. All doctoral candidates must also pass a final written and oral examination.

### Doctoral Candidacy for Direct Entry

To qualify for doctoral candidacy, the student must demonstrate mastery of four core courses of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics). To become a doctoral candidate, students must maintain a grade-point average of 3.250 or above in the four core courses and have no individual grade below a B– in the four core courses. Mastery of the four core courses must be demonstrated within the first year, unless an extension is granted by the department graduate committee.

In addition, each student must complete 4 semester hours of Research (CHME 9984) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal. The student must pass, as determined by the student's dissertation committee, this candidacy proposal defense in order to advance to doctoral candidacy. If the student fails, they may resubmit their proposal and retake the defense one time within four months, unless an extension is granted by the primary research

advisor and the department graduate committee. The student earns the classification of doctoral candidate upon successful completion of these requirements.

## **Doctoral Candidacy for Advanced Entry**

To become a doctoral candidate, advanced-entry students who have already completed a graduate degree in chemical engineering or a closely related discipline must petition the graduate committee of the Department of Chemical Engineering and demonstrate that the mastery has been attained through coursework either at Northeastern University or during a previous graduate degree from another institution (typically granted when the student has achieved a grade of at least A– in an equivalent course; an official transcript and relevant course syllabus from the previous degree will be required for verification). The student must demonstrate mastery of the four core areas of chemical engineering (thermodynamics or statistical thermodynamics, kinetics, transport, and mathematics) through course performance.

The graduate committee may require a student to take or retake any or all of the core courses before achieving doctoral candidacy. Incoming advanced-entry students should form a plan of coursework in consultation with the associate chair for graduate studies and have this approved by the graduate committee. For the core courses taken at Northeastern, students should maintain a GPA of 3.250 or above and have no individual grade below a B–.

In addition, each student must complete 4 semester hours of Research (CHME 9984) and demonstrate critical thinking, analysis, and experimental planning skills related to their dissertation research topic through a written candidacy proposal and an oral defense of this proposal. The student must pass, as determined by the student's dissertation committee, this candidacy proposal defense in order to advance to doctoral candidacy. If the student fails, they may resubmit their proposal and retake the defense one time within four months, unless an extension is granted by the primary research advisor and the department graduate committee. The student earns the classification of doctoral candidate upon successful completion of these requirements.

## **Course Requirements**

### **DIRECT ENTRY**

A minimum of 32 semester hours of academic coursework, **not including any directed study credits**, beyond the bachelor's degree is required. The 32 semester hours must include at least 24 semester hours of academic coursework (exclusive of thesis or dissertation) taken at Northeastern. All four of the core courses (see table under Program Requirements), the 4 semester hours of research, and the 4 semester hours of professional development courses must be included in the student's academic graduate coursework.

### **ADVANCED ENTRY**

A minimum of 20 semester hours of academic coursework, **not including any directed study credits**, beyond the master's degree is required. At least 16 semester hours of academic coursework (exclusive of thesis or dissertation) must be taken at Northeastern. At least one of the core courses (see table under Program Requirements), 4 semester hours of Research (CHME 9984), and 4 semester hours of professional development courses must be included in the student's academic graduate coursework. At least 8 semester hours of noncore electives must also be included. If the graduate committee requires additional core courses to achieve doctoral candidacy, these are in addition to the 20-semester-hour minimum.

### **GENERAL REQUIREMENTS**

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Research (CHME 9986), in a section for which their dissertation research advisor is listed as the instructor in the online registration system. The semester they plan to defend their proposal, they should register for Candidacy Preparation for Candidacy Preparation—Doctoral (CHME 8960) and for 4 semester hours of Research (CHME 9984).

After obtaining PhD candidacy, students are required to register for Dissertation Term 1 (CHME 9990) and Dissertation Term 2 (CHME 9991) for two consecutive semesters. This is then followed by registration for Dissertation Continuation (CHME 9996) in each semester thereafter until the dissertation has been completed and defended. Note: No course credits are awarded for Dissertation Term 1 (CHME 9990), Dissertation Term 2 (CHME 9991), or Dissertation Continuation (CHME 9996); however, a student is considered full time if registered for these courses.

All students pursuing a doctoral degree must enroll in the department's Seminar (CHME 7390) course for each semester they are working toward their degree.

Students will be advised on their courses for the first semester by the associate chair for graduate studies. After the first semester, students will work with their dissertation advisor to determine appropriate courses and course schedule to meet their educational needs and aspirations. Upon consultation with the dissertation advisor, a student may take up to 44 semester hours of course credit without additional financial penalty. Students and dissertation advisors should keep in mind that the university residency requirement requires two semesters of academic studies after becoming a doctoral candidate.

## **Language Requirement**

There is no foreign language requirement for the PhD degree. However, each candidate must be proficient in technical writing and oral presentation in the English language. The graduate committee may require additional coursework to improve language proficiency, if necessary.

## **Residence Requirement**

A student satisfies the residence requirement by completing one academic year of full-time graduate studies during two consecutive academic semesters after qualifying for doctoral candidacy. Additional required coursework (exclusive of seminars) may be completed during this period. Students are required to be continually enrolled while pursuing the completion of the dissertation.

## Dissertation

After a student establishes doctoral candidacy, they must complete a dissertation that embodies the results of extended original research and includes material suitable for publication. The student is responsible for proposing a dissertation committee to be approved by the dissertation advisor at least one month prior to the dissertation defense. The committee must have a minimum of four members, including the primary advisor. At least two committee members must be faculty members in the Department of Chemical Engineering (with a greater than 0% appointment). Additionally, one of the committee members must be external to the Department of Chemical Engineering. Committee membership is not limited to faculty at Northeastern or to engineering faculty. The student is encouraged to consider experts in the dissertation topic and to work with the dissertation advisor to create a meaningful and helpful committee. The dissertation committee will approve the dissertation in its final form. The graduate school requirements for dissertation formatting and electronic submittal instructions can be found on the College of Engineering's webpage (<https://coe.northeastern.edu/academics-experiential-learning/graduate-school-of-engineering/graduate-student-services/dissertation-thesis-instructions/>). Students are responsible for contacting the Graduate School of Engineering for any updates to dissertation requirements and appropriate deadlines.

## Dissertation Defense and Final Oral Examination

This comprehensive examination includes the public dissertation defense as well as a final oral examination to include the subject matter of the doctoral dissertation and significant developments in the field of the dissertation work. The oral presentation will be open to the public, including students, faculty, and the student's committee.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A minimum of 32 semester hours of academic coursework is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 32 required semester hours.

Code	Title	Hours
<b>Core Courses</b>		
A cumulative 3.250 GPA, with no individual class lower than a B–, is required for the following:		
CHME 7320 or ME 6200	Chemical Engineering Mathematics Mathematical Methods for Mechanical Engineers 1	4
CHME 7330	Chemical Engineering Thermodynamics	4
CHME 7340	Chemical Engineering Kinetics	4
CHME 7350	Transport Phenomena	4
<b>Research</b>		
CHME 9984	Research	4
<b>Professional Development</b>		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
<b>Seminar</b>		
Complete the following (repeatable) course each semester:		
CHME 7390	Seminar	
Recommended but optional:		

CHME 7395	Mentoring in Chemical Engineering
ENCP 6100	Introduction to Cooperative Education

## Electives

Code	Title	Hours
Complete 8 semester hours. Consult your faculty advisor for acceptable courses:		
BIOE 5410	Molecular Bioengineering	8
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7602	Pharmaceutical Engineering Laboratory	
CHME 7973	Special Topics in Chemical Engineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ME 5620	Fundamentals of Advanced Materials	
NNMD 5270	Foundations in Nanomedicine: Therapeutics	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	

## Dissertation

Code	Title	Hours
CHME 9990	Dissertation Term 1	
CHME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA overall required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Dissertation committee

Dissertation proposal  
Dissertation defense

## Core Requirements

A minimum of 20 semester hours (SH) of academic coursework is required, plus 2 optional semester hours for cooperative education and mentoring in chemical engineering. Independent study credits do not count toward the 20 required semester hours.

Code	Title	Hours
<b>Core Courses</b>		
Complete at least one of the four core classes. A cumulative 3.250 GPA—with no individual class below a B minus—is required for core classes taken: <sup>1</sup>		
CHME 7320 or ME 6200	Chemical Engineering Mathematics Mathematical Methods for Mechanical Engineers 1	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
<b>Research</b>		
CHME 9984	Research	4
<b>Seminar and Professional Development</b>		
CHME 7391	Professional Development and Communication in Chemical Engineering 1	1
CHME 7392	Professional Development and Communication in Chemical Engineering 2	1
CHME 7393	Professional Development and Communication in Chemical Engineering 3	1
CHME 7394	Professional Development and Communication in Chemical Engineering 4	1
Complete the following repeatable course each semester:		
CHME 7390	Seminar	
Recommended but optional:		
ENCP 6100	Introduction to Cooperative Education	
CHME 7395	Mentoring in Chemical Engineering	

## Electives

Code	Title	Hours
Complete a minimum of 8 semester hours. Consult your faculty advisor for acceptable courses:		
BIOE 5410	Molecular Bioengineering	8
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7602	Pharmaceutical Engineering Laboratory	
CHME 7973	Special Topics in Chemical Engineering	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
ME 5620	Fundamentals of Advanced Materials	

NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

## Dissertation

Code	Title	Hours
Complete the following two courses:		
CHME 9990	Dissertation Term 1	
CHME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

Minimum 20 total semester hours required

Minimum 3.000 GPA overall required

- <sup>1</sup> Additional core classes may be required by the chemical engineering graduate committee to achieve PhD candidacy, which would not count toward the 20 SH minimum for the PhD.

## Interdisciplinary Engineering, PhD

130 Snell Engineering Center  
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

## Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 410)
- Department of Chemical Engineering (p. 425)
- Department of Civil and Environmental Engineering (p. 440)
- Department of Electrical and Computer Engineering (p. 469)
- Department of Mechanical and Industrial Engineering (p. 531)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary engineering PhD requires the commitment by a faculty member at Northeastern to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

## Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the

other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

## Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

## Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

## Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Direct Entry

Complete all requirements listed below unless otherwise indicated.

## Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

## Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

## Dissertation

Code	Title	Hours
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991 or CHME 9991 or CIVE 9991 or EECE 9991 or IE 9991 or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Advanced Entry

Complete all requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

### Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		
		20

### Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

### Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

### Pharmaceutical Engineering, MS

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

### Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

### Restricted Elective Courses

Code	Title	Hours
At least 3 semester hours of total elective courses are required from pharmaceutical sciences (PHSC, PMST) and from chemical engineering (CHME). These semester hours could come from any elective group, as appropriate.		
<b>Regulatory</b>		
Complete 3 semester hours from the following:		
BIOT 5340	Introduction to Biotherapeutic Approvals	3
BIOT 5500	Concepts in Regulatory Science	
BIOT 6320	Design and Development of Biopharmaceuticals	
RGA 6002	Introduction to Regulatory Compliance and Practice	
<b>Quality/Statistics</b>		
Complete 4 semester hours from the following:		
CHME 5185	Design of Experiments and Ethical Research (DOER)	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
PHSC 6214	Experimental Design and Biostatistics	
<b>Depth Electives</b>		
Complete 7 semester hours from the following:		
BIOT 5330	Drug Safety and Immunogenicity	7
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 7250	Advanced Biotechnology Applications Laboratory	
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOER)	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7350	Transport Phenomena	

PHSC 5300	Pharmaceutical Biochemistry
PHSC 5310	Cellular Physiology
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 5560	Nanotoxicity
PHSC 5619	Mass Spectrometry in Drug Development
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Chemical Engineering, MSChE

For program contact information, please visit the College of Engineering website (<https://che.northeastern.edu/academics/graduate-studies/ms-chme/>).

The Master of Science in Chemical Engineering is normally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields. Students wishing to pursue the master's degree but with undergraduate educational backgrounds other than chemical engineering may be required to complete supplementary undergraduate coursework. These courses are in addition to the minimum course requirements. Students enrolled in the program are encouraged to seek guidance from their instructors and advisor regarding additional coursework that may supplement the graduate curriculum.

Students originally admitted to the master's degree program who wish to switch to the PhD program must petition the associate chair for graduate studies. If admission is granted, then the student must satisfy all the requirements of the doctoral degree program, including the requirements for doctoral candidacy.

## Course Requirements

A minimum of 32 semester hours of academic work is required to qualify for the Master of Science degree in chemical engineering.

**If pursuing the General Principles and Applications concentration,** students can select from either the master's project option or master's thesis option. Students completing the master's project will take the 4-semester-hour master's project course and 4 semester hours of a core course. Students in the thesis track will complete the 4-semester-hour master's project course followed by the 4-semester-hour thesis course. In addition, each full-time student pursuing a thesis option must enroll in Professional Development and Communication Essentials (CHME 6390) in their first two semesters followed by Seminar (CHME 7390) for each semester they continue to work toward their degree. The faculty advisor and the student establish the sequence of courses that students take to pursue the Master of Science in Chemical Engineering.

**If pursuing the Biosystems or Sustainability concentrations,** students must complete a minimum of 32 semester hours of coursework. In addition, during their first two semesters of enrollment, they must complete Professional Development and Communication Essentials (CHME 6390).

## Thesis Requirements

Students pursuing a Master of Science in Chemical Engineering with concentration in General Principles and Applications thesis option must submit to the Graduate School of Engineering a written thesis that is approved by the thesis committee and department chair. For details, see the graduate school requirements and electronic submittal instructions (<https://coe.northeastern.edu/academics-experiential-learning/graduate-school-of-engineering/graduate-student-services/dissertation-thesis-instructions/>). MS with thesis students must also complete an oral master's thesis defense in order to successfully complete the program. The student will be expected to form a master's thesis committee, composed of a minimum of three members—one who is the research advisor, one other faculty member from the chemical engineering department, and one member from outside the department. The oral presentation will be open to the public, including students, faculty, and the candidate's committee.

## Part-time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit. A minimum of 32 semester hours of academic coursework is required for part-time students.

Master of Science students wishing to change their status from part-time to full-time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

## Departure Prior to Thesis Completion

Occasionally, students must leave the chemical engineering department prior to completion of all degree requirements. In such instances, long time intervals have often elapsed before thesis or manuscript submission. Accordingly, the department has adopted the guideline that a student cannot

submit a thesis for credit beyond three years after the student stops actively pursuing the research. Exceptions may be granted upon petition to the departmental graduate committee. Petitions must demonstrate extenuating circumstances and prove that the research is still of value to the profession.

## **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### **Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors, in addition to the semester hours required for the chemical engineering concentration selected.

### **ENGINEERING BUSINESS**

#### **Master's Degree in Chemical Engineering with Graduate Certificate in Engineering Business**

Students may complete a Master of Science in Chemical Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. Students may use some of their breadth electives credits toward both the MS degree and the certificate. The certificate coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business. (p. 591)

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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All students must complete the following core requirements unless otherwise indicated. Courses cannot double count in two different categories.

## **Core Requirements**

Code	Title	Hours
CHME 6310	Python for Chemical Engineers	2
CHME 6320	Numerical and Statistical Methods for Chemical Engineering	4
CHME 6390	Professional Development and Communication Essentials <sup>1</sup>	0

## **Concentrations**

Complete one of the following concentrations:

- Biosystems (p. 436)
- General Principles and Applications (p. 437)
- Sustainability (p. 439)

## **Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

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### **BIOSYSTEMS CONCENTRATION**

Code	Title	Hours
CHME 5160	Drug Delivery: Engineering Analysis	4
or CHME 5630	Biochemical Engineering	
CHME 6430	Chemical Engineering for Biosystems and Biomaterials	2

### **Biosystems Depth Electives**

Complete 8 semester hours from the following (courses cannot count in multiple categories):

8

CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
<b>Biosystems Breadth Electives</b>		
Complete 12 semester hours from the following (courses cannot count in multiple categories):		12
BIOE 5410	Molecular Bioengineering	
CHEM 5620	Protein Chemistry	
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals	
CHEM 5638	Molecular Modeling	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5642	Photochemistry Fundamentals and Applications	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7973	Special Topics in Chemical Engineering	
CIVE 7251	Environmental Biological Processes	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
ME 5620	Fundamentals of Advanced Materials	
NNMD 5270	Foundations in Nanomedicine: Therapeutics	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	
PHSC 6214	Experimental Design and Biostatistics	

### GENERAL PRINCIPLES AND APPLICATIONS CONCENTRATION

Code	Title	Hours
CHME 6410	Chemical Engineering Research Methods	2
CHME 7330 or CHME 7350	Chemical Engineering Thermodynamics Transport Phenomena	4

### Thesis or Project Options

Complete one of the following options (courses cannot count in multiple categories):	8
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***Thesis Option***

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest:

CHME 7390	Seminar <sup>2</sup>
CHME 7945	Master's Project <sup>3</sup>
CHME 7990	Thesis

***Project Option***

CHME 7330 or CHME 7340 or CHME 7350	Chemical Engineering Thermodynamics Chemical Engineering Kinetics Transport Phenomena
CHME 7945	Master's Project

***Electives Course List***

Complete 12 semester hours from the following (courses cannot count in multiple categories):

12

BIOE 5410	Molecular Bioengineering
CHEM 5620	Protein Chemistry
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHEM 5651	Materials Chemistry of Renewable Energy
CHEM 5653	Electrochemistry of Renewable Energy Devices
CHME 5105	Materials Characterization Techniques
CHME 5137	Computational Modeling in Chemical Engineering
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5179	Complex Fluids and Everyday Materials
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5510	Fundamentals in Process Safety Engineering
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries
CHME 5621	Electrochemical Engineering
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials
CHME 5642	Photochemistry Fundamentals and Applications
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences
CHME 5683	Introduction to Polymer Science
CHME 7330	Chemical Engineering Thermodynamics
CHME 7340	Chemical Engineering Kinetics
CHME 7350	Transport Phenomena
CHME 7600	Pharmaceutical Engineering I
CHME 7601	Pharmaceutical Engineering II
CHME 7973	Special Topics in Chemical Engineering
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
ME 5620	Fundamentals of Advanced Materials
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5370	Nanomedicine Research Techniques
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
PHSC 6214	Experimental Design and Biostatistics

**SUSTAINABILITY CONCENTRATION**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CHME 5621 or CHME 5683	Electrochemical Engineering Introduction to Polymer Science	4
CHME 6420	Engineering for Chemical Sustainability	2
<b>Sustainability Depth Electives</b>		
Complete two of the following (courses cannot count in multiple categories):		8
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5621	Electrochemical Engineering	
CHME 5683	Introduction to Polymer Science	
<b>Sustainability Breadth Electives</b>		
Complete 12 semester hours from the following (courses cannot count in multiple categories):		12
BIOE 5410	Molecular Bioengineering	
CHEM 5638	Molecular Modeling	
CHEM 5651	Materials Chemistry of Renewable Energy	
CHEM 5653	Electrochemistry of Renewable Energy Devices	
CHME 5105	Materials Characterization Techniques	
CHME 5137	Computational Modeling in Chemical Engineering	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5515	Process Safety Engineering for Biotechnology and Pharmaceutical Industries	
CHME 5621	Electrochemical Engineering	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5642	Photochemistry Fundamentals and Applications	
CHME 5649	Numerical Strategies and Data Analytics for Chemical Sciences	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7340	Chemical Engineering Kinetics	
CHME 7350	Transport Phenomena	
CHME 7600	Pharmaceutical Engineering I	
CHME 7601	Pharmaceutical Engineering II	
CHME 7973	Special Topics in Chemical Engineering	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 7251	Environmental Biological Processes	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
ME 5620	Fundamentals of Advanced Materials	

<sup>1</sup> To be completed in the first two semesters in the program.<sup>2</sup> To be taken simultaneously with Thesis (CHME 7990).

3 To be taken prior to Thesis (CHME 7990).

## Process Safety Engineering, Graduate Certificate

The Graduate Certificate in Process Safety Engineering focuses on the integration of chemical engineering skills with the knowledge of process safety and regulation with specific attention on designing and developing solutions for industrial firms with the goal of creating environments that are safer and in compliance with regulatory rules and regulations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of chemical engineering knowledge and skills to lead efforts within companies to plan and implement process safety designs that assist in meeting the regulatory requirements and confirming code compliance within an industrial firm in order to maintain the safety, health, and welfare of their employees and the public as well as making industrial firms safer and profitable.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Process Safety</b>		
CHME 5510	Fundamentals in Process Safety Engineering	4
CHME 5520	Process Safety Engineering—Chemical Reactivity, Reliefs, and Hazards Analysis	4
<b>Relief and Scenario Modeling</b>		
CHME 6610	Computational Programs in Process Safety for Relief and Scenario Modeling	4
<b>Special Topics</b>		
CHME 7262	Special Topics in Process Safety	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

## Civil and Environmental Engineering

Website (<https://cee.northeastern.edu/>)

**Jerome F. Hajjar, PhD, PE**  
CDM Smith Professor and Chair

400 Snell Engineering Center  
617.373.2444  
617.373.4419 (fax)

### Overview

With a strategic focus in urban engineering and through a range of teaching and research strengths, anchored by several multidisciplinary, multi-institutional centers and programs, our academic programs are designed to prepare professionals to address the global, complex, and ever-evolving engineering challenges of our time by building on current department strengths and expanding into vital areas. We give our future master's and PhD graduates the opportunity to make real-world impact on and long-lasting contributions to the well-being and development of society.

### Mission of the Department

Advancing innovative civil and environmental solutions for society and creating globally oriented engineering leaders by integrating experiential education and use-inspired interdisciplinary research.

## Academic Programs

Within our graduate programs, students work alongside world-class faculty on advanced research and courses, developing a solid base for their careers. Three overarching themes are emphasized in our programs: environmental health, civil infrastructure security, and sustainable resource engineering. These themes are aligned with the department's premier strengths in simulation (both computational and experimental), smart sensing, data and network science, and urban informatics and are all reflected in the courses offered in our graduate programs.

### MASTER OF SCIENCE DEGREE

The department offers five MS degree programs in the following areas: civil engineering (students can choose one out of six concentrations); environmental engineering; engineering and public policy; sustainable building systems; and climate science and engineering (in partnership with the Department of Marine and Environmental Science in the College of Science). Options for a master's thesis or report in place of coursework are available. All civil and environmental engineering master's programs are available on a full-time or part-time basis. For a full list of the department's academic program offerings, please refer to the Programs (p. 441) tab.

### DOCTOR OF PHILOSOPHY DEGREE

The department offers the following PhD degrees: PhD in Civil and Environmental Engineering and Interdisciplinary PhD. The doctoral program is designed to be flexible with respect to subject area and may be adapted to any subject area in civil and environmental engineering, including interdisciplinary options within the department or across departments or colleges.

The PhD is awarded to students who demonstrate high academic achievement and research competence in the selected field. Students must pursue the PhD program on a basis consistent with the residence requirements for the degree (p. 441).

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 609) in combination with the MS degree.

## Programs

### Doctor of Philosophy (PhD)

- Civil and Environmental Engineering (p. 441)
- Interdisciplinary Engineering (p. 418)

### Master of Science (MS)

- Climate Science and Engineering
- Engineering and Public Policy (p. 448)

### Master of Science in Civil Engineering (MSCivE)

- Civil Engineering with Concentration in Construction Management (p. 451)
- Civil Engineering with Concentration in Data and Systems (p. 453)
- Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering (p. 455)
- Civil Engineering with Concentration in Structures (p. 457)
- Civil Engineering with Concentration in Transportation (p. 459)
- Civil Engineering with Concentration in Water, Environmental, and Coastal Systems (p. 461)

### Master of Science in Environmental Engineering (MSEnvE)

- Environmental Engineering (p. 463)

### Master of Science in Sustainable Building Systems (MSSBS)

- Sustainable Building Systems (p. 465)

## Graduate Certificate

- Climate and Engineering (p. 467)
- Sustainability Engineering (p. 468)

### Civil and Environmental Engineering, PhD

The Doctor of Philosophy in Civil and Environmental Engineering offers students an opportunity for in-depth study in a broad range of areas in civil and environmental engineering. Awarding the Doctor of Philosophy degree is based on ability to formulate and execute original research addressing

important problems and completion of a rigorous academic program that enhances the student's knowledge in relevant areas. The PhD program has two components:

1. An academic program of graduate-level courses that provides depth in a specific area of Civil and Environmental Engineering (the major field) as well as other coursework that provides additional exposure at an advanced level to one or more disciplines
2. The dissertation, an extended independent research effort on a relevant technical problem resulting in an original contribution to the field

Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying examinations (both written and oral area exams) and all the required coursework.

Each student's mastery of subject matter is measured by a qualifying examination covering a subset of topics selected from the major field. A doctoral dissertation committee periodically monitors research progress, and the candidate is required to present and defend his or her research results before the doctoral dissertation committee upon completion of the work.

## **Coursework Requirement**

The academic program must include at least 20 semester hours (Advanced Standing) or 48 semester hours (Direct Entry) of graduate-level coursework at Northeastern University. A student may count no more than 4 semester hours of independent study (such as special project in civil and environmental engineering) toward the minimum course requirements. For direct entry students, a minimum of 40 semester hours must be related to the major field but may include courses from other departments when appropriate. The civil and environmental engineering (CEE) department encourages flexibility in program definition, especially in areas where complementary courses exist in other departments or where expertise resides outside the department and where the objective is to introduce new technology in civil and environmental engineering practice.

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Exam Preparation—Doctoral (CIVE 8960), in a section for which their research or academic advisor is listed as the instructor in the online registration system.

Upon successful completion of the qualifying exam and the majority of required coursework, each doctoral candidate must register in two consecutive semesters for Dissertation Term 1 (CIVE 9990) and Dissertation Term 2 (CIVE 9991). Upon completion of this sequence, the candidate must register for Dissertation Continuation (CIVE 9996) in every semester until the dissertation is complete. Students may not register for Continuation until they fulfill the two-semester dissertation sequence.

## **Qualifying Examination and Degree Candidacy**

The objective of the doctoral qualifying examination is to determine whether the applicant possesses mastery of the fundamentals and ability to apply them to solve unfamiliar problems that require analysis, synthesis, and independent thinking, as well as communication skills to present research ideas and plans, motivate problems, respond to related questions, and defend assumptions and technical approach.

The qualifying exam includes written and oral components. Its content depends upon the educational background and objectives of the student. In general, the written component covers four subject areas selected from the major field and includes engineering and science disciplines, as well as civil and environmental engineering application areas. The oral component measures general comprehension and aptitude for research. If a student fails the exam, he or she may retake it one more time with the permission of the qualifying examination committee.

The qualifying exam is administered within the first 18 months of the PhD program, if the student already holds an MS degree. PhD students who begin the PhD program without a MS degree should take the qualifying exam within the first 30 months of the start of the program.

Under extraordinary circumstances, a student may be granted one additional semester before taking the qualifying exam but only by prior petition to the advisor, concentration representative, and graduate studies committee.

## **DISSERTATION**

Once degree candidacy is established, a doctoral candidate may proceed with his or her dissertation. The candidate must write a dissertation proposal and name a CEE faculty member as the dissertation advisor. The candidate and the advisor must form a dissertation committee, which should have no fewer than four members, of which at least two are full-time (or affiliated) faculty from the CEE department. The committee will monitor progress and approve the final document.

## **DISSERTATION PROPOSAL PRESENTATION**

Each student, along with a faculty advisor, must jointly develop a proposal defining the content of the academic program, subject to review by the dissertation committee. Intellectual rigor, connectivity of subject matter, and compatibility with departmental interests are critical issues. The doctoral dissertation committee's approval of the proposal represents a mutual agreement between the student and the committee.

## **Comprehensive Examination**

The comprehensive exam is a defense of the doctoral research work and an examination on subject matter related to the dissertation area.

Each doctoral candidate must defend his or her dissertation within seven years from the start of the PhD program.

## **Annual Report**

At the beginning of each calendar year, all CEE doctoral students including interdisciplinary students within CEE, should complete the Annual PhD Student Progress Report, which details academic and research activities and accomplishments over the previous year. These forms will be reviewed by the faculty in each respective concentration to ensure satisfactory progress, with feedback provided to the students as necessary.

## Residence Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residence. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

## Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Qualifying examination and comprehensive examination

Annual review

Dissertation proposal

Dissertation committee

Dissertation defense

## Core Requirements

Complete at least 48 semester hours of approved coursework. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Directed Study (CIVE 7976) will be accepted toward the 48-semester-hour requirement.

## Dissertation

Code	Title	Hours
Complete the following:		
CIVE 9990	Dissertation Term 1	
CIVE 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Coursework Requirement

The CEE department encourages flexibility in program definition, especially in areas where complementary courses exist in other departments or where expertise resides outside the department and where the objective is to introduce new technology in civil and environmental engineering practice. The academic program must include at least 20 semester hours of graduate-level coursework at Northeastern University. A student may count no more than 4 semester hours of directed study toward the minimum course requirements.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Qualifying examination and comprehensive examination  
 Annual review  
 Dissertation proposal  
 Dissertation committee  
 Dissertation defense

## Core Requirements

Complete 20 semester hours of approved coursework. Consult your faculty advisor for acceptable courses. Please note that a maximum of 4 semester hours of Directed Study (CIVE 7976) will be accepted toward the 20-semester-hour requirement.

## Dissertation

Code	Title	Hours
CIVE 9990	Dissertation Term 1	
CIVE 9991	Dissertation Term 2	

## Coursework Requirement

The academic program must include at least 20 semester hours of graduate-level coursework at Northeastern University.

A student may count no more than 4 semester hours of directed study toward the minimum course requirements.

## Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

## Interdisciplinary Engineering, PhD

130 Snell Engineering Center  
 617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

## Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 410)
- Department of Chemical Engineering (p. 425)
- Department of Civil and Environmental Engineering (p. 440)
- Department of Electrical and Computer Engineering (p. 469)
- Department of Mechanical and Industrial Engineering (p. 531)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary engineering PhD requires the commitment by a faculty member at Northeastern to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary

and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

## **Qualifying Examination and Degree Candidacy**

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

## **Dissertation**

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

## **Residency Requirement**

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

## **Language Requirement**

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## **Direct Entry**

Complete all requirements listed below unless otherwise indicated.

### **Milestones**

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

### **Requirements**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

### **Dissertation**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991 or CHME 9991 or CIVE 9991 or EECE 9991	Dissertation Term 2	

or IE 9991	Dissertation Term 2
or ME 9991	Dissertation Term 2

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Advanced Entry

Complete all requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

### Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

### Dissertation

Code	Title	Hours
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991 or CHME 9991 or CIVE 9991 or EECE 9991 or IE 9991 or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

## Climate Science and Engineering, MS

### Overview

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research.

Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses and includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

## Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below; any core course not used to meet this core course requirement can be taken as a restricted elective:		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change	
	Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5670 or ENVR 5670	Global Biogeochemistry	
	Global Biogeochemistry	
CIVE 7110	Critical Infrastructure Resilience	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below.		12

### REPORT OPTION

Code	Title	Hours
CIVE 7945 or EEMB 8984	Master's Project	4
	Research	

Complete 8 semester hours from the restricted electives course list below.

8

**THESIS OPTION**

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		
CIVE 7945 and CIVE 7990	Master's Project and Thesis	8
EEMB 8984	Research (Completed twice)	

Complete 4 semester hours from the restricted electives course list below.

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

**Restricted Electives**

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Engineering and Public Policy, MS**

For program contact information, please visit the College of Engineering website (<https://cee.northeastern.edu/academics/graduate-studies/ms-cepp/>).

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy and Urban Affairs, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH

Master of Science report/thesis	4 SH	8 SH
Minimum semester hours required	32 SH	32 SH

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Engineering and Public Policy with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Engineering and Public Policy in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Sustainable Engineering and Systems Modeling Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		
CIVE 5261 or PPUA 5261	Dynamic Modeling for Environmental Investment and Policymaking Dynamic Modeling for Environmental Decision Making	12
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5368	Air Quality Management	
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 6777	Climate Hazards and Resilient Cities Abroad	
CIVE 6778	Climate Adaptation and Policy Abroad	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7155	Dynamics and Control of Infrastructure Systems	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
IE 5500	Systems Engineering in Public Programs	
IE 5640	Data Mining for Engineering Applications	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
ME 5645	Environmental Issues in Manufacturing and Product Use	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	
SBSY 5400	Sustainable Building Systems Seminar	

## Public Policy and Analysis Requirements

Code	Title	Hours
Complete 8 semester hours from the following:		
ECON 7266	Economics of Government	8
INSH 5301	Introduction to Computational Statistics	

INSH 6300	Research Methods in the Social Sciences
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
LPSC 7311	Strategizing Public Policy
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5260	Ecological Economics
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation
PPUA 6525	Institutions and Public Policy
PPUA 6532	Building Resilience into Local Government
PPUA 7237	Advanced Spatial Analysis of Urban Systems

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the Elective Course List below.	12

### PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
	Complete 8 semester hours from the Elective Course List below.	8

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
	Complete 4 semester hours from the Elective Course List below.	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Elective Course List

Code	Title	Hours
CIVE 5150	Climate and Atmospheric Change	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5670	Global Biogeochemistry	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7392	Special Topics in Environmental Engineering (Equity in Civil and Environmental Engineering)	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 6102	Environmental Science and Policy Seminar 2	
INSH 7400	Quantitative Analysis	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	

PHTH 5214	Environmental Health
PTH 5230	Global Health
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5268	International Environmental Policy
PPUA 5270	Food Systems and Public Policy
PPUA 6101	Environmental Science and Policy Seminar 1
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context
PPUA 7346	Resilient Cities

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Civil Engineering with Concentration in Construction Management, MSCivE

This program is intended for students interested in construction management and engineering or a closely related field. It includes required core courses primarily from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in civil and environmental engineering and other departments such as mechanical and industrial engineering and business administration. Based on proven proficiency in given areas, students may waive certain core courses and replace them with alternate elective courses.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	18 SH	18 SH	18 SH
Elective courses	10 SH	6 SH	14 SH
Master of Science report/thesis	4 SH	8 SH	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with a Concentration in Construction Management with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with a Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 34-semester-hour degree and certificate will require fulfillment of the 18-semester-hour construction management core.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

### ENGINEERING BUSINESS

#### Master's Degree in Civil Engineering with Concentration in Construction Management with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Civil Engineering with Concentration in Construction Management in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

Engineering Business (p. 591)

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CIVE 5221	Construction Project Control and Organization	2
CIVE 7220	Construction Management	4
CIVE 7230	Legal Aspects of Civil Engineering	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 14 semester hours from the course list below.	14

### REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 10 semester hours from the course list below.		10

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 6 semester hours from the course list below.		6

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Course List

Code	Title	Hours
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 7151	Urban Informatics and Processing	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7301	Advanced Soil Mechanics	
CIVE 7302	Advanced Foundation Engineering	
DAMG 6210	Data Management and Database Design	
EMGT 5300	Engineering/Organizational Psychology	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5617	Lean Concepts and Applications	
IE 5640	Data Mining for Engineering Applications	
or IE 7275	Data Mining in Engineering	
IE 7215	Simulation Analysis	
IE 7290	Reliability Analysis and Risk Assessment	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	

OR 6205	Deterministic Operations Research
SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5250	Building Performance Simulation
SBSY 5300	Information Systems for Integrated Project Delivery

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Civil Engineering with Concentration in Data and Systems, MSCivE

This program is designed for students with career goals that require application of data and systems analysis to challenges across any discipline of civil and environmental engineering. The degree requirements include core courses (total of 20 semester hours) in data analysis and computing, systems and sensors, and data and systems topics in civil and environmental engineering, complemented by electives across multiple departments including mathematics, computer science, engineering, economics, and policy.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with Concentration in Data and Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Data and Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 20-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved data and systems engineering technical courses.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated. At least 20 semester hours (of the 32 semester hours) must be listed as CIVE or SBSY and must form a cohesive advisor-approved program.

## Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following course lists:		
<b>Data and Computing</b>		
Complete at least 4 semester hours from the following:		
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	20
or ENVR 6500	Biostatistics	
or IE 6200	Engineering Probability and Statistics	4

or IE 7280	Statistical Methods in Engineering
or INSH 5301	Introduction to Computational Statistics
or MATH 7343	Applied Statistics
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
CIVE 7151	Urban Informatics and Processing
or PPUA 5262	Big Data for Cities
CIVE 7155	Dynamics and Control of Infrastructure Systems
DAMG 6105	Data Science Engineering with Python
DAMG 6210	Data Management and Database Design
ENVR 5260	Geographical Information Systems
IE 5640	Data Mining for Engineering Applications
or IE 7275	Data Mining in Engineering

**Systems and Sensors**

Complete at least 4 semester hours from the following:	4
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure
CIVE 5524	Vibration-Based Structural Health Monitoring
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure)
EECE 5155	Wireless Sensor Networks and the Internet of Things
IE 5500	Systems Engineering in Public Programs
OR 6205	Deterministic Operations Research
OR 7230	Probabilistic Operation Research
OR 7245	Network Analysis and Advanced Optimization
PHYS 5116	Network Science 1
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 7237	Advanced Spatial Analysis of Urban Systems

**Civil and Environmental Systems**

Complete at least 8 semester hours from the following:	8
CIVE 5281	Coastal Dynamics and Design
CIVE 5363	Climate Science, Engineering Adaptation, and Policy
CIVE 5373	Transportation Systems: Analysis and Planning
CIVE 5522 or CIVE 7330	Structural Systems Modeling Advanced Structural Analysis
CIVE 5536	Hydrologic and Hydraulic Design
CIVE 7110	Critical Infrastructure Resilience
CIVE 7341	Structural Reliability
CIVE 7380	Performance Models and Simulation of Transportation Networks
CIVE 7381	Transportation Demand Forecasting and Model Estimation
CIVE 7385	Public Transportation
IE 7200	Supply Chain Engineering
OR 7310	Logistics, Warehousing, and Scheduling
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5250	Building Performance Simulation

**Options**

Complete one of the following options:

**COURSEWORK OPTION**

Code	Title	Hours
Complete the remaining semester hours from the electives list below.		12

**REPORT OPTION**

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete the remaining semester hours from the electives list below.		8

**THESIS OPTION**

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete the remaining semester hours from the electives list below.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

**Course Lists**

Any core course not used to meet the core course requirements can be used as an elective, as can the following electives:

**ELECTIVES LIST**

Code	Title	Hours
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7220	Construction Management	
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7382	Advanced Traffic Control and Simulation	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7204	Applied Probability and Stochastic Processes	
IE 5617	Lean Concepts and Applications	
IE 7215	Simulation Analysis	
SBSY 5300	Information Systems for Integrated Project Delivery	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Civil Engineering with Concentration in Geotechnical/Geoenvironmental Engineering, MSCivE**

This program includes study in the areas of soil mechanics/foundations and geoenvironmental engineering. It includes studies of soil and related earth materials for problems related to the protection of human health and the environment. Related areas include soil mechanics, fate/transport in subsurfaces, subsurface remediation, and others. The degree requirements include core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Elective courses	20 SH	16 SH	24 SH
Master of Science report/thesis	4 SH	8 SH	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

Master's Degree in Civil Engineering with a Concentration in Geotechnical/Geoenvironmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with a Concentration in Geotechnical/Geoenvironmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 8-semester-hour core curriculum and 12 semester hours of restricted electives from the geotechnical/geoenvironmental engineering concentration coursework.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand. For students pursuing a concentration in geotechnical/geoenvironmental engineering, the two courses required by the concentration are offered in alternate years. To complete this certificate program in two years, one of the courses needs to be taken in the first year and the other in the second year.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CIVE 7301	Advanced Soil Mechanics	4
CIVE 7302	Advanced Foundation Engineering	4

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
	Complete 24 semester hours from the electives list below.	24

#### PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
	Complete 20 semester hours from the electives list below.	20

#### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
	Complete 16 semester hours from the electives list below.	16

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

### Electives List

Code	Title	Hours
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 5699	Special Topics in Civil Engineering (Vibration-based Structural Health Monitoring)	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7240	Construction Equipment and Modeling	
CIVE 7250	Environmental Chemistry	

CIVE 7251	Environmental Biological Processes
CIVE 7260	Hydrologic Modeling
CIVE 7311	Soil and Foundation Dynamics
CIVE 7312	Earthquake Engineering
CIVE 7313	Ground Improvement
CIVE 7330	Advanced Structural Analysis
CIVE 7331	Structural Dynamics
IE 6200	Engineering Probability and Statistics
IE 7290	Reliability Analysis and Risk Assessment
ME 5657	Finite Element Method 1

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Civil Engineering with Concentration in Structures, MScivE

For program contact information, please visit this website (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>).

This program is designed for students with career goals in structural engineering and structural design. The program includes courses in structural analysis and design, structural mechanics, dynamics of structures, earthquake engineering, wind engineering, and structural health monitoring. The degree requirements include core courses from the Department of Civil and Environmental Engineering, complemented by electives in civil and environmental engineering, as well as electives from other departments such as mechanical and industrial engineering and mathematics.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Restricted electives	12 SH	12 SH	12 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with Concentration in Structures with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Structures in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 8-semester-hour core curriculum and 12 semester hours of restricted electives from the structures concentration coursework.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CIVE 7330	Advanced Structural Analysis	4
CIVE 7331	Structural Dynamics	4

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the restricted electives below.	12
	Complete 12 semester hours from the other electives below.	12

### PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
	Complete 12 semester hours from the restricted electives below.	12
	Complete 8 semester hours from the other electives below.	8

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
	Complete 12 semester hours from the restricted electives below.	12
	Complete 4 semester hours from the other electives below.	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Course Lists

### RESTRICTED ELECTIVES LIST

Code	Title	Hours
CIVE 5522	Structural Systems Modeling	
CIVE 7302	Advanced Foundation Engineering	
CIVE 7312	Earthquake Engineering	
CIVE 7340	Seismic Analysis and Design	
CIVE 7341	Structural Reliability	
CIVE 7342	System Identification	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7354	Wind Engineering	
CIVE 7355	Advanced Bridge Design	
CIVE 7357	Advanced Structural Mechanics	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	

### OTHER ELECTIVES LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5520	Structural Systems	
CIVE 5524	Vibration-Based Structural Health Monitoring	
CIVE 5525	Prestressed Concrete Design	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7301	Advanced Soil Mechanics	

CIVE 7311	Soil and Foundation Dynamics
MATH 7241	Probability 1
MATH 7342	Mathematical Statistics
MATH 7343	Applied Statistics
MATL 7365	Properties and Processing of Electronic Materials
ME 5240	Computer Aided Design and Manufacturing
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5658	Continuum Mechanics
ME 5659	Control Systems Engineering
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 7238	Finite Element Method 2
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Civil Engineering with Concentration in Transportation, MSCivE

This program is designed for students with career goals in transportation engineering and transportation planning. The degree requirements include core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in civil and environmental engineering and by related courses in applied mathematics, engineering, economics, policy, and management.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science report/thesis	4 SH	8 SH	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with Concentration in Transportation with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Transportation in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 20-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 12-semester-hour core curriculum and 8 semester hours of restricted electives from the transportation concentration coursework.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CIVE 5373	Transportation Systems: Analysis and Planning	4
CIVE 5376	Traffic Engineering and Sustainable Urban Street Design	4
IE 6200	Engineering Probability and Statistics	4

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the restricted electives list below.	12
	Complete 8 semester hours from the other electives list below.	8

### REPORT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
	Complete 8 semester hours from the restricted electives list below.	8
	Complete 8 semester hours from the other electives list below.	8

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
	Complete 8 semester hours from the restricted electives list below.	8
	Complete 4 semester hours from the other electives list below.	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Course Lists

### RESTRICTED ELECTIVES LIST

Code	Title	Hours
CIVE 6566	Sustainable Urban Transportation: Netherlands	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7380	Performance Models and Simulation of Transportation Networks	
CIVE 7381	Transportation Demand Forecasting and Model Estimation	
CIVE 7382	Advanced Traffic Control and Simulation	
CIVE 7385	Public Transportation	
CIVE 7387	Design Aspects of Roadway Safety	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	

### OTHER ELECTIVES LIST

Any restricted elective not used to meet the restricted elective requirement can be used as another elective. Courses outside this list may be taken as electives with advisor approval.

Code	Title	Hours
DAMG 6210	Data Management and Database Design	
IE 7275	Data Mining in Engineering	
IE 7290	Reliability Analysis and Risk Assessment	
MATH 7343	Applied Statistics	
OR 6205	Deterministic Operations Research	
OR 7230	Probabilistic Operation Research	

OR 7245

Network Analysis and Advanced Optimization

PPUA 5263

Geographic Information Systems for Urban and Regional Policy

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Civil Engineering with Concentration in Water, Environmental, and Coastal Systems, MSCivE

This program integrates the study of infrastructure; hydrology; hydraulics; engineering for coastal areas; numerical modeling; remote sensing; spatial and temporal data analysis; and physical, chemical, and biological processes that impact the water and air quality to provide students with the knowledge and tools for developing and managing sustainable, resilient water resources and infrastructure. It includes required core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-cive/>), complemented by electives in electrical and computer engineering, mechanical and industrial engineering, and earth and environmental sciences.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	8 SH	8 SH	8 SH
Restricted electives	12 SH	12 SH	12 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
<b>Minimum semester hours required</b>	<b>32 SH</b>	<b>32 SH</b>	<b>32 SH</b>

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Civil Engineering with Concentration in Water, Environmental, and Coastal Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 12-semester-hour core curriculum and 8 semester hours of restricted electives from the WECS concentration coursework.

The Department of Civil and Environmental Engineering encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete 8 semester hours of the following:		
CIVE 5281	Coastal Dynamics and Design	8
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
CIVE 7260	Hydrologic Modeling	
CIVE 7281	Coastal and Nearshore Hydrodynamics	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the Restricted Electives List below.	12
	Complete 12 semester hours from the Other Electives List below.	12

### PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
	Complete 12 semester hours from the Restricted Electives List below.	12
	Complete 8 semester hours from the Other Electives List below.	8

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
	Complete 12 semester hours from the Restricted Electives List below.	12
	Complete 4 semester hours from the Other Electives List below.	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Course Lists

### RESTRICTED ELECTIVES LIST

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 5366	Air Quality Engineering and Science	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7110	Critical Infrastructure Resilience	
CIVE 7255	Environmental Physical/Chemical Processes	
CIVE 7278	Air Quality Modeling and Forecasting	
CIVE 7279	Advanced Air Quality	
CIVE 7282	Coastal and Hydraulic Modeling	
ME 6200	Mathematical Methods for Mechanical Engineers 1	

### OTHER ELECTIVES LIST

Any required core course not used to meet the required core course or restricted elective requirements can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5150	Climate and Atmospheric Change	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5670	Global Biogeochemistry	
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering	
CIVE 7151	Urban Informatics and Processing	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	

CIVE 7392	Special Topics in Environmental Engineering (Equity in Civil and Environmental Engineering)
EECE 7204	Applied Probability and Stochastic Processes
ENVR 5260	Geographical Information Systems
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7290	Reliability Analysis and Risk Assessment
MATH 7341	Probability 2
MATH 7343	Applied Statistics
MATH 7344	Regression, ANOVA, and Design

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Environmental Engineering, MSEnvE

This program integrates the study of physical, chemical, and biological processes and fundamental principles for water and wastewater treatment and disposal, hazardous waste management, surface water and groundwater quality, water resources management, and air quality management. Successful graduates will have the ability to develop and implement technologies for various environmental applications with the goal to improve and protect the environment and human health. It includes required core courses from the Department of Civil and Environmental Engineering (<https://cee.northeastern.edu/academics/graduate-studies/ms-envi/>) (CEE), complemented by electives in civil and environmental engineering, mechanical and industrial engineering, earth and environmental sciences, and mathematics.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core electives	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	12 SH
Other electives	8 SH	4 SH	8 SH
Master of Science project/thesis	4 SH	8 SH	

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Environmental Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Environmental Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved environmental engineering technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete three of the following:		
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	12

CIVE 5368	Air Quality Management
CIVE 7250	Environmental Chemistry
CIVE 7251	Environmental Biological Processes
CIVE 7255	Environmental Physical/Chemical Processes

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 12 semester hours from the Restricted Electives List below.	12
	Complete 8 semester hours from the Other Electives List below.	8

### PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
	Complete 8 semester hours from the Restricted Electives List below.	8
	Complete 8 semester hours from the Other Electives List below.	8

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
	Complete 8 semester hours from the Restricted Electives List below.	8
	Complete 4 semester hours from the Other Electives List below.	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Course Lists

### RESTRICTED ELECTIVES LIST

Any required core course not used to meet the required core course requirement can be taken as a restricted elective.

Code	Title	Hours
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5255	Tools and Techniques of Environmental Health	
CIVE 5261	Dynamic Modeling for Environmental Investment and Policymaking	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5369	Atmospheric Boundary Layer Flows	
CIVE 5536	Hydrologic and Hydraulic Design	
CIVE 7278	Air Quality Modeling and Forecasting	
CIVE 7279	Advanced Air Quality	
CIVE 7392	Special Topics in Environmental Engineering (Aquatic Biogeochemistry)	

### OTHER ELECTIVES LIST

Any required core course not used to meet the required core course requirement can be taken as another elective. Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
CIVE 5150	Climate and Atmospheric Change	
CIVE 5260	Environmental Fluid Mechanics	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5670	Global Biogeochemistry	
CIVE 7100	Time Series and Geospatial Data Sciences	

CIVE 7151	Urban Informatics and Processing
CIVE 7260	Hydrologic Modeling
CIVE 7392	Special Topics in Environmental Engineering (Equity in Civil and Environmental Engineering)
EECE 7204	Applied Probability and Stochastic Processes
ENVR 5190	Soil Science
ENVR 5260	Geographical Information Systems
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
IE 7290	Reliability Analysis and Risk Assessment
MATH 7241	Probability 1
MATH 7343	Applied Statistics
MATH 7344	Regression, ANOVA, and Design

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Sustainable Building Systems, MSSBS

Website (<https://cee.northeastern.edu/academics/graduate-studies/ms-subs/>)

The sustainable building systems program focuses on the design and operation of buildings to provide a comfortable, healthy, and productive indoor environment with minimal energy and environmental impact. Students have an opportunity to develop leadership and decision-making skills to implement sustainable building practices in either the private or public sectors in the global market.

The graduates of the Master of Science in Sustainable Building Systems (<https://cee.northeastern.edu/academics/graduate-studies/ms-subs/>) program should display a high level of engineering knowledge in a broad range of architectural engineering, civil engineering, and construction management while embracing the concepts of engineering sustainability as related to energy and materials usage and the effects on the environment. Graduates will have the base training necessary to lead efforts within companies to plan and implement sustainable practices for the design and operation of buildings, realize energy and materials efficiency improvements, and minimize environmental impact. Upon graduation, students will have a theoretical background to the concepts behind the LEED (Leadership in Energy and Environmental Design) Green Associate examination.

Below is a typical course sequence for graduation in two semesters. The program is flexible to accommodate full-time students—who wish to proceed over a period of two to four semesters—and part-time students—who can complete the program requirements by taking one to two courses per semester, finishing the program in approximately four years.

Degree Requirements	With Project	With Thesis	Coursework Only
Core courses	12 SH	12 SH	12 SH
Restricted electives	8 SH	8 SH	8 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Sustainable Building Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Sustainable Building Systems in addition to earning a Graduate Certificate in Engineering Leadership. Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require fulfillment of the 12-semester-hour core curriculum and 8 semester hours of restricted electives from the sustainable building systems coursework.

The Civil and Environmental Engineering Department encourages students pursuing a GIEL certificate to complete their MS coursework requirements in their first year and their GIEL certificate requirements in their second year. Students who prefer to complete their GIEL certificate requirements in their first year are asked to speak with their MS degree advisor beforehand.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ARCH 5210 and ARCH 5211	Environmental Systems and Recitation for ARCH 5210	4
SBSY 5100	Sustainable Design and Technologies in Construction	4
SBSY 5200	Sustainable Engineering Systems for Buildings	4
Students must register for this 0-semester-hour course every semester:		
SBSY 5400	Sustainable Building Systems Seminar	

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 8 semester hours from the restricted electives list below.		8
Complete 12 semester hours from the other electives list below.		12

#### PROJECT OPTION

Code	Title	Hours
SBSY 7945	Master's Project	4
Complete 8 semester hours from the restricted electives list below.		8
Complete 8 semester hours from the other electives list below.		8

#### THESIS OPTION

Code	Title	Hours
SBSY 7945	Master's Project	4
SBSY 7990	Thesis	4
Complete 8 semester hours from the restricted electives list below.		8
Complete 4 semester hours from the other electives list below.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

### Electives

#### RESTRICTED ELECTIVES LIST

Code	Title	Hours
Complete 8 semester hours from the following:		8
ARCH 5220	Integrated Building Systems	
CIVE 5221	Construction Project Control and Organization	
CIVE 5231	Alternative Project Delivery Systems in Construction	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 7220 or EMGT 5220	Construction Management	
	Engineering Project Management	
CIVE 7230	Legal Aspects of Civil Engineering	
EMGT 6305	Financial Management for Engineers	

SBSY 5250	Building Performance Simulation
SBSY 5300	Information Systems for Integrated Project Delivery

### OTHER ELECTIVES LIST

Any restricted elective not used to meet the restricted elective requirement can be taken as another elective.

Code	Title	Hours
Complete 12 semester hours from the following:		
ACCT 6200	Financial Reporting and Managerial Decision Making 1	
ACCT 6201	Financial Reporting and Managerial Decision Making 2	
CIVE 7151	Urban Informatics and Processing	
CIVE 7350	Behavior of Concrete Structures	
CIVE 7351	Behavior of Steel Structures	
CIVE 7388	Special Topics in Civil Engineering (Dynamics and Control of Infrastructure Systems)	
FINA 6200	Value Creation through Financial Decision Making	
FINA 6216	Valuation and Value Creation	
FINA 6217	Real Estate Finance and Investment	
LPSC 7312	Cities, Sustainability, and Climate Change	
ME 5645	Environmental Issues in Manufacturing and Product Use	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Climate and Engineering, Graduate Certificate

Climate change is a defining challenge of the 21st century. This three-course certificate in climate and engineering provides students with the foundational knowledge of how climate change will impact engineered systems and approaches for adaptation at multiple scales. Students will also acquire the analytical skills to evaluate technologies and engineering approaches for safety, climate effectiveness, and equality in societal costs and benefits.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
Complete one of the following:		
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5699	Special Topics in Civil Engineering (Climate Technologies for Decarbonization, Mitigation, and Adaptation)	

### Electives

Code	Title	Hours
Complete two of the following:		
CIVE 5150	Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5670	Global Biogeochemistry	

CIVE 5699	Special Topics in Civil Engineering (Intro to Air Quality Engineering Science)
CIVE 5699	Special Topics in Civil Engineering (Climate Technologies for Decarbonization, Mitigation, and Adaptation)
CIVE 5984	Research (4 SH, with topic approval of program advisor)
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Sustainability Engineering, Graduate Certificate

### Overview

Society is facing increasingly complex and multidisciplinary challenges in balancing the relationship between the built environment and the earth system. The four-course certificate in sustainability engineering provides foundational knowledge that facilitates framing challenges and working on multidisciplinary topics to address sustainability challenges, including engineering perspectives, toolsets, and data methods.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Requirements

Code	Title	Hours
Complete one of the following:		
CIVE 5150	Climate and Atmospheric Change	4
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
Complete one of the following:		
CIVE 5699	Special Topics in Civil Engineering (Intro to Air Quality Engineering Science - 4 semester hours)	4
CIVE 7250	Environmental Chemistry	
CIVE 7251	Environmental Biological Processes	
Complete one of the following:		
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	4
CIVE 6566	Sustainable Urban Transportation: Netherlands	
SBSY 5100	Sustainable Design and Technologies in Construction	
Complete one of the following:		
CIVE 5373	Transportation Systems: Analysis and Planning	4
CIVE 5984	Research (4 semester hours)	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7260	Hydrologic Modeling	
CIVE 7388	Special Topics in Civil Engineering (Random Data and Processing)	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Electrical and Computer Engineering

Website (<https://ece.northeastern.edu/>)

### **Josep M. Jornet, PhD**

Professor and Interim Chair through January 2025

### **Edmund Yeh, PhD**

Professor and Chair

409 Dana Research Center

617.373.7529

617.373.4431 (fax)

The Department of Electrical and Computer Engineering's graduate program is a dynamic and thriving center of world-recognized research in a wide range of areas. The department has strong ties to local industry and the world-famous hospitals and medical centers of Boston and is involved in many joint research projects with them. With five NSF- and DHS-funded research centers and over 20 industrial partners, faculty and students are actively conducting cutting-edge research in areas such as computer vision; pattern recognition and machine learning; brain-computer interface; computer architecture; high-performance computing; embedded systems; hardware and software security; power systems and power electronics; underwater communication networks and signal processing; robotics; information theory; communications, control, and signal processing; Internet of Things; RF electromagnetics, optics, and magnetic materials; micro/nanomechanical structures and advanced nanomaterials; power-first system/computer architecture; ultralow power biomedical and neural circuits and systems.

ECE's graduate program educates MS and PhD students with deep fundamental and practical knowledge in the various disciplines of electrical and computer engineering by offering a strong curriculum and providing opportunities for research in these disciplines. The department educates the next generation of highly skilled engineers and researchers with necessary skills to address the future needs of academia, industry, government, and humanity.

### **Overview of Programs Offered**

ECE's graduate program offers a Master of Science in Electrical and Computer Engineering, a Master of Science in Electrical and Computer Engineering Leadership, a Master of Science in Applied Physics and Engineering, a Master of Science in Data Science, a Master of Science in Robotics, a Master of Science in Internet of Things, a Master of Science in Wireless and Network Engineering, a Doctor of Philosophy in Computer Engineering, a Doctor of Philosophy in Cybersecurity, a Doctor of Philosophy in Electrical Engineering, and a Doctor of Philosophy in Interdisciplinary Engineering (housed in the College of Engineering).

### **Mission of the Department**

The primary educational missions of the electrical and computer engineering department are to educate undergraduate students so they have the opportunity to obtain successful careers in electrical and computer engineering and related disciplines and pursue advanced graduate study in engineering or related disciplines. The mission of the graduate program is to educate graduate students so they have the skills to solve complex engineering problems and can make meaningful contributions to research and industry.

### **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION**

Students have the opportunity to pursue the Master of Science in Electrical and Computer Engineering Leadership (MSECEL) (p. 531) along with the Graduate Certificate in Engineering Leadership.

In addition, students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1127) in combination with the Master of Science in Electrical and Computer Engineering. This option results in an increase in total hours beyond that required for the master's degree only.

### **Programs**

#### **Doctor of Philosophy (PhD)**

- Computer Engineering (p. 470)
- Cybersecurity (p. 374)
- Electrical Engineering (p. 476)
- Interdisciplinary Engineering (p. 418)

#### **Master of Science (MS)**

- Applied Physics and Engineering (p. 480)
- Data Science (p. 351)

- Internet of Things (p. 358)
- Robotics (p. 488)
- Semiconductor Engineering (p. 491)
- Wireless and Network Engineering (p. 495)

## **Master of Science in Electrical and Computer Engineering (MSECE)**

- Concentration in Communications, Control, and Signal Processing (p. 497)
- Concentration in Computer Networks and Security (p. 501)
- Concentration in Computer Systems and Software (p. 505)
- Concentration in Computer Vision, Machine Learning, and Algorithms (p. 509)
- Concentration in Electromagnetics, Plasma, and Optics (p. 514)
- Concentration in Hardware and Software for Machine Intelligence (p. 518)
- Concentration in Microsystems, Materials, and Devices (p. 522)
- Concentration in Power Systems (p. 526)

## **Master of Science in Electrical and Computer Engineering Leadership (MSECEL)**

- Electrical and Computer Engineering Leadership (p. 531)

## **Computer Engineering, PhD**

The Doctor of Philosophy in Computer Engineering offers students an opportunity for study in a broad range of areas in computer engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

### **Qualifying Exam and Degree Candidacy**

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or advanced entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

### **Annual Review**

PhD students are reviewed annually. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory.

### **Residence Requirement**

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

### **Dissertation**

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track Department of Electrical and Computer Engineering faculty, and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

### **DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION**

Upon successful completion of the PhD qualifying exam and the required coursework, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until they fulfill the two-semester sequence of Dissertation.

### **REGISTRATION REQUIREMENTS FOR PREDCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS**

The ECE department requires that predoctoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predoctoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

### **PHD PROPOSAL REVIEW**

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits their dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and their performance in graduate courses, as well as examine the student on subject matter related to their graduate coursework and dissertation subject area.

### **FINAL DISSERTATION DEFENSE**

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Annual departmental review (each fall semester after the student has been in the program for at least one year)

Qualifying examination  
Dissertation committee  
Proposal stage review  
Dissertation defense

### **Core Requirements**

Code	Title	Hours
EECE 9990	Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult faculty research advisor for acceptable courses.	48

### **Dissertation**

Code	Title	Hours
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

### **Program Credit/GPA Requirements**

48 total semester hours required  
Minimum 3.000 GPA required

### **Advanced Entry Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Annual review (each fall semester after the student has been in the program for at least one year)  
Qualifying examination  
Dissertation committee  
Proposal stage review  
Dissertation defense

## Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

## Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Cybersecurity, PhD

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern University's Khouri College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and "smart" IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.
  - The International Secure Systems Lab (<http://www.iseclab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
  - The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

## Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

## Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 GPA, with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

**RESIDENCY**

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

**TEACHING REQUIREMENT**

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

**DISSERTATION ADVISING**

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

**DISSERTATION COMMITTEE**

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD cybersecurity curriculum committee. The four members must include the advisor, two internal members, and an external member.

**COMPREHENSIVE EXAMINATION**

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

**DISSERTATION DEFENSE**

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

**AWARDING OF MASTER'S DEGREES**

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of earning a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

**Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Teaching  
Qualifying exam and area exam  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

**Core Requirements**

A grade of B or higher is required in each core course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
<b>Foundations</b>		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
CY 5770 or EECE 5641	Software Vulnerabilities and Security Introduction to Software Security	4

CY 6740 or EECE 5699	Network Security Computer Hardware and System Security	4
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**Electives and Tracks**

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
<b>Tracks</b>		
Select at least two courses from one track:		
<i>Hardware Security</i>		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
<i>Machine Learning</i>		
CS 5700	Fundamentals of Computer Networking	
CS 6140	Machine Learning	
CS 7150	Deep Learning	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
<i>Network Security</i>		
CS 6710	Wireless Network	
CY 6740	Network Security	
CS 7610	Foundations of Distributed Systems	
CS 7775	Seminar in Computer Security	
CY 5130	Computer System Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 7336	Digital Communications	
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	
<i>Systems Security</i>		
CS 6410	Compilers	
CS 7600	Intensive Computer Systems	
CS 7610	Foundations of Distributed Systems	
CY 5130	Computer System Security	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
EECE 7352	Computer Architecture	
<i>Theory</i>		
CS 7800	Advanced Algorithms	
CS 7805	Complexity Theory	
CS 7810	Foundations of Cryptography	
CS 7870	Seminar in Theoretical Computer Science	
EECE 7337	Information Theory	
<i>Usable Security and Privacy</i>		
CS 6350	Empirical Research Methods	
CS 6760	Privacy, Security, and Usability	
CS 7340	Theory and Methods in Human Computer Interaction	
INSH 6300	Research Methods in the Social Sciences	
INSH 6302	Qualitative Methods	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	

**Cybersecurity Policy**

CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy

**Electives**

Selected in consultation with advisor from graduate-level CS and ECE courses and graduate-level courses offered by the College of Social Sciences and Humanities, including CRIM, CS, CY, DS, EECE, INSH, MATH and POLS.

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**Dissertation**

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
CY 9996	Dissertation Continuation	

**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.000 GPA required

**Advanced Entry Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Degree Requirements**

Incoming PhD in Cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

**Doctoral Degree Candidacy**

Refer to the PhD Cybersecurity overview (p. 374) for admission to candidacy requirements.

**Residency**

Refer to the PhD Cybersecurity overview (p. 374) for residency requirements.

**Teaching Requirement**

Refer to the PhD Cybersecurity overview (p. 374) for teaching requirements.

**Dissertation Advising**

Refer to the PhD Cybersecurity overview (p. 374) for dissertation advising requirements.

**Dissertation Committee**

Refer to the PhD Cybersecurity overview (p. 374) for dissertation committee requirements.

**Comprehensive Examination**

Refer to the PhD Cybersecurity overview (p. 374) for comprehensive examination requirements.

**Dissertation Defense**

Refer to the PhD Cybersecurity overview (p. 374) for dissertation defense and completion requirements.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

- Teaching
- Qualifying exam and area exam
- Annual review
- Dissertation proposal
- Dissertation committee
- Dissertation defense

## Core Requirement

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
	Consult your faculty advisor for approved courses.	16

## Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
CY 9996	Complete the following (repeatable) course until graduation: Dissertation Continuation	16

## Program Credit/GPA Requirements

- Minimum 16 semester hours required
- Minimum 3.000 GPA required

## Electrical Engineering, PhD

The PhD program in electrical engineering offers students an opportunity for study in a broad range of areas in electrical engineering. Details on PhD requirements can be found in the *Graduate Program Guide*. A summary of requirements is given below.

### Qualifying Exam and Degree Candidacy

The PhD qualifying exam is the examination for admissions to the doctoral programs in electrical engineering and in computer engineering. The exam has the dual purposes of serving as an indicator of the student's capability for successful completion of the PhD in electrical engineering or in computer engineering and of serving as a guide to the student's advisor in developing a suitable plan of study, tailored to the individual needs of the student.

A student who has matriculated into the PhD program is considered a predoctoral student, whether they are BS entry or advanced entry. Upon successful completion of the qualifying exam, the student is designated a PhD candidate. A student who fails the qualifying exam will be permitted to retake the exam only one more time.

### Annual Review

PhD students are reviewed annually. Each student is evaluated and receives a grade of satisfactory, needs improvement, or unsatisfactory.

### Residence Requirement

After reaching PhD candidacy, one year of full-time graduate work or two consecutive years of part-time graduate work satisfy the university residence requirement. In the latter case, the student's advisor must approve a detailed schedule in order to ensure that the student devotes at least half of the time to the requirements of the Graduate School of Engineering.

### Dissertation

Within one year of passing the PhD qualifying exam, the PhD candidate must form a dissertation committee. A dissertation committee must have at least three members that hold a PhD or equivalent degree. At least two of the committee members must be tenured or tenure-track ECE faculty and the committee must include the student's advisor. The chair of the committee must be a tenured or tenure-track faculty member in the ECE department.

The dissertation committee must design an appropriate program of study that prepares the student to be a successful doctoral-level engineer as well as direct the candidate's dissertation research. The dissertation committee will approve the dissertation in final form.

### DISSERTATION AND DISSERTATION CONTINUATION REGISTRATION

Upon successful completion of the PhD qualifying exam and the required coursework, the PhD candidate must register in two consecutive semesters for Dissertation Term 1 (EECE 9990) and Dissertation Term 2 (EECE 9991). Upon completion of this sequence, the student must register for

Dissertation Continuation (EECE 9996) in every semester until the dissertation is completed. A student may not register for Continuation until they fulfill the two-semester sequence of Dissertation.

### **REGISTRATION REQUIREMENTS FOR PREDCTORAL AND PHD CANDIDATE GRADUATE ASSISTANTS**

The ECE department requires that predotoral students and PhD candidates who hold research or teaching assistantships be registered full-time. Predotoral PhD students may register for Research (EECE 9986) (zero credit, full-time equivalent) if needed to fulfill the registration requirement.

### **PHD PROPOSAL REVIEW**

Each PhD candidate must demonstrate, by means of the proposal review, subject matter knowledge satisfactory for the award of the degree.

The proposal review is an oral presentation followed by a question-and-answer session administered by the student's dissertation advisor/committee. The proposal review will be given at the time the student submits their dissertation proposal to the dissertation advisor/committee for approval. As part of this exam, the dissertation advisor/committee will review the student's doctoral program and their performance in graduate courses, as well as examine the student on subject matter related to their graduate coursework and dissertation subject area.

### **FINAL DISSERTATION DEFENSE**

The final dissertation defense will include the subject matter of the dissertation and significant developments in the field of the dissertation work. Other related fields may be included if recommended by the examining faculty. The dissertation defense must be scheduled at least six months after the PhD proposal review.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Annual review (each fall semester after the student has been in the program for at least one year)

Qualifying examination

Dissertation committee

Proposal stage review

Dissertation defense

### **Core Requirements**

Code	Title	Hours
EECE 9990	Complete 32 semester hours of approved coursework—equivalent of MSECE degree. Then complete 16 semester hours, of which 8 must be graduate-level EECE courses. Consult your faculty research advisor for acceptable courses.	48

### **Dissertation**

Code	Title	Hours
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

### **Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.000 GPA required

### **Advanced Entry Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review (each fall semester after the student has been in the program for at least one year)  
 Qualifying examination  
 Dissertation committee  
 Proposal stage review  
 Dissertation defense

## Core Requirements

Complete 16 semester hours of approved coursework. At least 8 semester hours must be graduate-level EECE courses. Consult your faculty adviser for acceptable courses.

## Dissertation

Code	Title	Hours
Complete the following two courses:		
EECE 9990	Dissertation Term 1	
EECE 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Interdisciplinary Engineering, PhD

130 Snell Engineering Center

617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

## Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 410)
- Department of Chemical Engineering (p. 425)
- Department of Civil and Environmental Engineering (p. 440)
- Department of Electrical and Computer Engineering (p. 469)
- Department of Mechanical and Industrial Engineering (p. 531)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary engineering PhD requires the commitment by a faculty member at Northeastern to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

## Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

### Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

### Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

### Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Direct Entry

Complete all requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

### Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

### Dissertation

Code	Title	Hours
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991 or CHME 9991 or CIVE 9991 or EECE 9991 or IE 9991 or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

### Advanced Entry

Complete all requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

### Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

### Dissertation

Code	Title	Hours
BIOE 9990 or CHME 9990 or CIVE 9990 or EECE 9990 or IE 9990 or ME 9990	Dissertation Term 1	
BIOE 9991 or CHME 9991 or CIVE 9991 or EECE 9991 or IE 9991 or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

## Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

### Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 481)
- Electromagnetics, Plasma, and Optics (p. 482)
- Microsystems, Materials, and Devices (p. 482)

## Optional Thesis

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		
PHYS 7990	Thesis (completed twice over two semesters)	8
<b>Option 1 (College of Science thesis advisor)</b>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
<b>Option 2 (College of Engineering thesis advisor)</b>		

## Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

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## ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
<b>Core Courses</b>		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	

PHYS 7305	Statistical Physics	
PHYS 7335	Dynamical Processes in Complex Networks	
<b>ELECTROMAGNETICS, PLASMA, AND OPTICS</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Core Courses</b>		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	
<b>MICROSYSTEMS, MATERIALS, AND DEVICES</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Core Courses</b>		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7734	Topics: Condensed Matter Physics	

## Data Science, MS

Khoury College of Computer Sciences and the Department of Electrical and Computer Engineering jointly offer an interdisciplinary Master of Science in Data Science. This program is designed to give students a comprehensive framework for reasoning about data. Students engage in extensive coursework intended to develop depth in data collection, storage, retrieval, manipulation, visualization, modeling, and interpretation. Students are also able to choose elective courses from a variety of offerings in Khoury, the College of Engineering, and throughout the campus to explore areas that generate data or specialized data science applications. Successful program graduates are well positioned to attain data scientist and data engineer positions in a fast-growing field or to progress into doctoral degrees in related disciplines.

During the admissions process, applicants take a pretest to determine if the Master of Science in Data Science or Master of Science in Data Science (p. 353)–(p. )Align (p. 353) fits better with their current skill level. In addition, prospective applicants work with recruitment and enrollment coaching teams to select the appropriate program before applying.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

Students should refer to the course numbering table for graduate course leveling (p. 176).

### Core Requirements

A cumulative GPA of 3.000 or higher is required in the following core courses.

Code	Title	Hours
Complete 20 semester hours from the following:		
<b>Data Management and Processing</b>		
DS 5110	Introduction to Data Management and Processing	4
<b>Algorithms</b>		
Complete 4 semester hours from the following:		
CS 5800	Algorithms	4
EECE 7205	Fundamentals of Computer Engineering	
<b>Machine Learning and Data Mining</b>		
DS 5220	Supervised Machine Learning and Learning Theory	4
DS 5230	Unsupervised Machine Learning and Data Mining	4
<b>Presentation and Visualization</b>		
DS 5500	Data Science Capstone	4

### Electives

Code	Title	Hours
Complete 12 semester hours from the following: <sup>1</sup>		
<b>Khoury College of Computer Sciences</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5200	Database Management Systems	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5610	Web Development	
CS 6120	Natural Language Processing	
CS 6200	Information Retrieval	
CS 6240	Large-Scale Parallel Data Processing	
CS 6350	Empirical Research Methods	

CS 6620	Fundamentals of Cloud Computing
CS 6650	Building Scalable Distributed Systems
CS 7140	Advanced Machine Learning
CS 7150	Deep Learning
CS 7180	Special Topics in Artificial Intelligence
CS 7200	Statistical Methods for Computer Science
CS 7250	Information Visualization: Theory and Applications
CS 7280	Special Topics in Database Management
CS 7290	Special Topics in Data Science
DS 5983	Topics in Data Science
DS 7990	Thesis
DS 7995	Project
<b>College of Engineering</b>	
CIVE 7100	Time Series and Geospatial Data Sciences
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5645	Parallel Processing for Data Analytics
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
IE 6700	Data Management for Analytics
IE 7280	Statistical Methods in Engineering
<b>College of Social Sciences and Humanities</b>	
ECON 5140	Applied Econometrics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 5266	Urban Theory and Science
PPUA 7237	Advanced Spatial Analysis of Urban Systems
<b>College of Science</b>	
ENVR 5563	Advanced Spatial Analysis
PHYS 5116	Network Science 1
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics
<b>Bouvé College of Health Sciences</b>	
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6224	Social Epidemiology
<b>College of Arts, Media and Design</b>	
GSND 5110	Game Design and Analysis
GSND 6350	Data-Driven Player Modeling

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Students taking electives worth less than 4 semester hours (i.e., Bouvé courses) should enroll for an accompanying data science project course in the same semester to bring the cumulative semester hours to 4. In order to earn this additional credit, students are expected to work with faculty to design an additional project in line with the curricular aims of their chosen elective and the data science core learning outcomes.

researchers and a specialized workforce that will lead the development of a globally interconnected continuum of untethered devices and objects interacting with the physical environment, people, and each other. The program will provide students with the necessary knowledge and skills to understand, design, and implement autonomous wireless networked systems of tomorrow operating in uncertain, challenging, extreme environments through a combination of coursework, master project research, and/or industry experience.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Fundamental Requirements

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things	4
Complete one of the following:		4
EECE 5576	Wireless Communication Systems	
EECE 7364	Mobile and Wireless Networking	
Complete one of the following:		4
CS 5800	Algorithms	
CS 7800	Advanced Algorithms	
EECE 7205	Fundamentals of Computer Engineering	
Complete one of the following:		4
CS 6140	Machine Learning	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)	
Complete one of the following:		4
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7368	High-Level Design of Hardware-Software Systems	
Complete one of the following for a total of 4 semester hours:		4
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
INNO 6230 and EECE 7400	Platform Innovation and Advanced Special Problems in Electrical and Computer Engineering	
MGMT 6280 and EECE 7400	Innovation for Next-Generation Products and Systems and Advanced Special Problems in Electrical and Computer Engineering	
Complete one of the following:		4
CY 5120	Applied Cryptography	
CY 5150	Network Security Practices	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 6740	Network Security	
CY 6760	Wireless and Mobile Systems Security	
EECE 5641	Introduction to Software Security	
EECE 5699	Computer Hardware and System Security	

## Options

### COURSEWORK OPTION

Code	Title	Hours
Complete 4 semester hours from the concentration course list below. (p. 359)		4

**MASTER'S PROJECT OPTION**

Code	Title	Hours
EECE 7945	Master's Project	4

**Concentration Course List**

Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the program director.

Code	Title	Hours
<b>Courses in College of Engineering</b>		
<i>Electrical and Computer Engineering</i>		
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5606	Micro- and Nanofabrication	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5666	Digital Signal Processing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networked XR Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications)	
EECE 5699	Computer Hardware and System Security	
EECE 7150	Autonomous Field Robotics	
EECE 7200	Linear Systems Analysis	
EECE 7201	Solid State Devices	
EECE 7202	Electromagnetic Theory 1	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7275	Antennas and Radiation	
EECE 7310	Modern Signal Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7336	Digital Communications	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7346	Probabilistic System Modeling and Analysis	
EECE 7352	Computer Architecture	
EECE 7370	Advanced Computer Vision	
EECE 7374	Fundamentals of Computer Networks	

EECE 7390	Computer Hardware Security
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances on Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)

**Bioengineering**

BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
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**Civil and Environmental Engineering**

CIVE 5280	Remote Sensing of the Environment
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
CIVE 7151	Urban Informatics and Processing
CIVE 7380	Performance Models and Simulation of Transportation Networks

**Courses Outside College of Engineering****Khoury College of Computer Science***Computer Science*

CS 5700	Fundamentals of Computer Networking
CS 6140	Machine Learning
CS 7150	Deep Learning

*Cybersecurity*

CY 5120	Applied Cryptography
CY 5150	Network Security Practices
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security

**D'Amore-McKim School of Business***Entrepreneurship and Innovation*

INNO 6200	Enterprise Growth and Innovation
INNO 6222	Competing in Dynamic, Innovation-Driven Markets

*Management*

MGMT 6280	Innovation for Next-Generation Products and Systems
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*Entrepreneurship Technological*

ENTR 6240	Emerging and Disruptive Technologies
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader

**Bouvé College of Health Sciences***Health Informatics*

HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6400	Introduction to Health Data Analytics

*Nursing*

NRSG 6306	Health Informatics
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**College of Arts, Media and Design***Communication Studies*

COMM 6605	Youth and Communication Technology
<b>School of Law</b>	
LW 6101	Introduction to Legal Studies 1: Law and Legal Reasoning
LW 6102	Introduction to Legal Studies 2
LW 6140	Data Regulation and Compliance
LW 6231	Identifying and Securing Intellectual Property Rights
LW 6232	Intellectual Property and Media
LW 6400	Law, Policy and Legal Argument
LW 7369	Intellectual Property
LW 7669	Law and Technology
<b>College of Social Sciences and Humanities</b>	
<i>Law and Public Policy</i>	
LPSC 7312	Cities, Sustainability, and Climate Change
<i>Public Policy and Urban Affairs</i>	
PPUA 5262	Big Data for Cities
<i>Political Science</i>	
POLS 7341	Security and Resilience Policy
POLS 7346	Resilient Cities
<i>Philosophy</i>	
PHIL 5005	Information Ethics
<b>College of Science</b>	
<i>Physics</i>	
PHYS 5116	Network Science 1

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Robotics, MS

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted (as of Spring 2025) to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

## Gordon Institute of Engineering Leadership

### Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
Complete one of the following:		
ME 5250	Robot Mechanics and Control	4
ME 5659	Control Systems Engineering	
<b>Electrical and Computer Engineering</b>		
Complete one of the following:		
EECE 5550	Mobile Robotics	4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
Complete one of the following:		
CS 5180	Reinforcement Learning and Sequential Decision Making	4
CS 5335	Robotic Science and Systems	

## Concentrations

Complete one of the following concentrations:

- Computer Science (p. 489)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 489)—College of Engineering
- Mechanical Engineering (p. 490)—College of Engineering

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
<b>Required Course</b>		
Complete one additional CS course not used to fulfill the core requirements:		
CS 5180	Reinforcement Learning and Sequential Decision Making	4
CS 5335	Robotic Science and Systems	
<b>Complete one of the following options:</b>		
<i>Coursework Option</i>		
Complete 16 semester hours of courses from the elective course list. (p. 490)		
<i>Project Option</i>		
CS 8674	Master's Project	4
Complete 12 semester hours of courses from the elective course list. (p. 490)		
<i>Thesis Option</i>		
CS 8674	Master's Project	4
CS 7990	Thesis	4
Complete 8 semester hours of courses from the elective course list. (p. 490)		

## ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.		
<b>Required Course</b>		

Complete one additional EECE course not used to fulfill the core requirements:

4

EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 490)

16

*Project Option*

EECE 7945                    Master's Project

4

Complete 12 semester hours of courses from the elective course list. (p. 490)

12

*Thesis Option*

EECE 7945                    Master's Project

4

EECE 7990                    Thesis

4

Complete 8 semester hours of courses from the elective course list. (p. 490)

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## MECHANICAL ENGINEERING

Code	Title	Hours
Students in the mechanical engineering concentration follow the College of Engineering co-op policies.		
<b>Required Course</b>		
Complete one additional ME course not used to fulfill the core requirements:		
ME 5250	Robot Mechanics and Control	4
ME 5659	Control Systems Engineering	

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 490)

16

*Project Option*

ME 7945                    Master's Project

4

Complete 12 semester hours of courses from the elective course list. (p. 490)

12

*Thesis Option*

ME 7945                    Master's Project

4

ME 7990                    Thesis

4

Complete 8 semester hours of courses from the elective course list. (p. 490)

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Elective Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

Code	Title	Hours
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	

EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5580	Classical Control Systems
EECE 5639	Computer Vision
EECE 5642	Data Visualization
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7150	Autonomous Field Robotics
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7370	Advanced Computer Vision
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
IE 6500	Human Performance
IE 7280	Statistical Methods in Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5659	Control Systems Engineering
ME 5665	Musculoskeletal Biomechanics
ME 6200	Mathematical Methods for Mechanical Engineers 1
ME 6260	Introduction to Microelectromechanical Systems (MEMS)
ME 6250	Wearable Robotics
ME 7247	Advanced Control Engineering
PT 5170	Motor Control
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7005	Experimental Design and Applied Statistics
PT 7020	Technologies in Movement and Rehabilitation Science

## Semiconductor Engineering, MS

Admissions to this program begin Fall 2025.

The Master of Science in Semiconductor Engineering, offered by the Institute for NanoSystems Innovation—along with the Department of Electrical and Computer Engineering, the Department of Mechanical and Industrial Engineering, and the Department of Chemical Engineering in the College of Engineering—and the D'Amore-McKim School of Business, is designed to meet the burgeoning demand for skilled professionals in the semiconductor industry. This cutting-edge program aims to equip students with the knowledge and skills necessary to excel in this rapidly evolving field.

The national landscape is witnessing a significant uptick in interest in expanding the talent pool within the semiconductor sector, particularly following the enactment of the U.S. CHIPS and Science Act of 2022. This pivotal legislation has catalyzed a marked increase in the demand for engineers, drawing considerable attention from a wide array of companies to the semiconductor industry. There is a need for skilled workers to build new plants to increase and localize manufacturing capacity, design chips, and the tools that make the chips. This program is strategically positioned to address this growing need, offering a comprehensive educational experience that prepares our graduates to lead and innovate in this critical domain.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>NanoSystems</b>		
Complete one of the following:		4
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
<b>Manufacturing</b>		
Complete one of the following:		4
EECE 5606	Micro- and Nanofabrication	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5630	Nano- and Microscale Manufacturing	
<b>Innovation</b>		
Complete four semester hours from the following. Students may not meet this requirement solely with directed study coursework:		4
BUSN 6379	Entrepreneurial Ecosystems	
BUSN 6389	Leading Global Virtual Innovation Teams	
CHME 5976	Directed Study	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
INNO 6200	Enterprise Growth and Innovation	
ME 5976	Directed Study	

## Concentrations

Complete one of the following concentrations:

- Devices and NanoSystems (p. 492)
- Materials and Manufacturing (p. 493)

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### DEVICES AND NANOSYSTEMS

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		
EECE 5606	Micro- and Nanofabrication	8
EECE 5651	Introduction to Photonic Devices	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
EECE 7250	Power Management Integrated Circuits	
EECE 7353	VLSI Design	
Complete one of the following options for 12 semester hours:		
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 493)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 8 semester hours from the restricted electives course list. (p. 493)		

***Thesis Option***

EECE 7945	Master's Project
EECE 7990	Thesis

Complete 4 semester hours from the restricted electives course list. (p. 493)

**MATERIALS AND MANUFACTURING CONCENTRATION**

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		
CHME 5105	Materials Characterization Techniques	8
IE 6200	Engineering Probability and Statistics	
IE 7270	Intelligent Manufacturing	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5245	Mechatronic Systems	
ME 5620	Fundamentals of Advanced Materials	
ME 5630	Nano- and Microscale Manufacturing	

Complete one of the following options for 12 semester hours:

***Coursework Option***

Complete 12 semester hours from the restricted electives course list. (p. 493)

***Project Option***

ME 7945	Master's Project
or CHME 7945	Master's Project
or IE 7945	Master's Project

Complete 8 semester hours from the restricted electives course list. (p. 493)

***Thesis Option***

ME 7945	Master's Project	
or CHME 7945	Master's Project	
or IE 7945	Master's Project	
ME 7990		
or CHME 7990	Thesis	
or IE 7990	Thesis	

Complete 4 semester hours from the restricted electives course list. (p. 493)

**Restricted Electives Course List**

Any course in the following elective lists will fulfill the restricted elective requirement, provided the course has not already been applied to fulfill core requirements of this program and provided the student satisfies prerequisites. Students can take electives outside of these lists with prior approval from the faculty advisor.

Code	Title	Hours
<b>Elective Courses in Engineering and Science</b>		
CHME 5105	Materials Characterization Techniques	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5621	Electrochemical Engineering	
CHME 5642 and CHME 5643	Photochemistry Fundamentals and Applications and Photochemistry Lab	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering (BioMEM Systems)	
CHME 5699	Special Topics in Chemical Engineering (Carbon Capture Storage and Utilization)	
CHME 7340	Chemical Engineering Kinetics	
EECE 5606	Micro- and Nanofabrication	
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5651	Introduction to Photonic Devices	

EECE 5652	Microwave Circuits and Systems
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)
EECE 7201	Solid State Devices
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7296	Electronic Materials
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Tech)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
IE 5617	Lean Concepts and Applications
IE 5137	Computational Modeling in Industrial Engineering
IE 6200	Engineering Probability and Statistics
IE 6300	Manufacturing Methods and Processes
IE 6700	Data Management for Analytics
IE 7200	Supply Chain Engineering
IE 7270	Intelligent Manufacturing
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
MATL 6250	Soft Matter
MATL 6290	Fundamentals of Nanostructured Materials
MATL 7365	Properties and Processing of Electronic Materials
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5520	Fundamentals and Applications of Optics and Photonics
ME 5600	Materials Processing and Process Selection
ME 5620	Fundamentals of Advanced Materials
ME 5630	Nano- and Microscale Manufacturing
ME 5640	Additive Manufacturing
ME 5645	Environmental Issues in Manufacturing and Product Use
PHYS 5114	Physics and Applications of Quantum Materials
PHYS 5125	Advanced Quantum Mechanics
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 5318	Principles of Experimental Physics
PHYS 5352	Quantum Computation and Information

**Elective Courses in Innovation**

A maximum of 4 semester hours may be taken from the following:

FINA 6309	Foundations of Accounting and Finance
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers

HRMG 6200	Managing People and Organizations
HRMG 6230	Leading a Diverse and Inclusive Organization
HRMG 6280	The Human Side of Innovation
INNO 6200	Enterprise Growth and Innovation
MGMT 6213	Managing Ethics in the Workplace and Marketplace
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment
MKTG 6200	Creating and Sustaining Customer Markets

FINA, HRMG, INNO, MGMT, and MKTG courses listed above are 3 semester hours, so students may take one additional 1 semester hour of courses from the list below for a total of 4 semester hours:

BUSN 6379	Entrepreneurial Ecosystems
BUSN 6389	Leading Global Virtual Innovation Teams
CHME 5976	Directed Study
ME 5976	Directed Study

## Wireless and Network Engineering, MS

### Overview

The Master of Science in Wireless and Network Engineering is administered by the Institute for the Wireless Internet of Things and the Department of Electrical and Computer Engineering. This program is aimed at preparing highly qualified researchers and a specialized workforce that will lead the future of our hyperconnected society. The program will provide students with the necessary knowledge and skills to understand, design, and implement present and future wireless and wired communication networks through a combination of coursework, master's thesis research, and/or industry experience.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Fundamental Requirements

Code	Title	Hours
Complete two of the following:		
EECE 5576	Wireless Communication Systems	8
EECE 7364	Mobile and Wireless Networking	
EECE 7374	Fundamentals of Computer Networks	

### Options

#### COURSEWORK OPTION

Code	Title	Hours
Complete 24 semester hours from the concentration course list below. (p. 496)		

#### THESIS OPTION

Code	Title	Hours
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
Complete 16 semester hours from the concentration course list below. (p. 496)		

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Concentration Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the program director.

Code	Title	Hours
<b>Electrical and Computer Engineering</b>		
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5360	Combinatorial Optimization	
EECE 5610	Digital Control Systems	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5666	Digital Signal Processing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networked XR Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications)	
EECE 5699	Computer Hardware and System Security	
EECE 7200	Linear Systems Analysis	
EECE 7202	Electromagnetic Theory 1	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7275	Antennas and Radiation	
EECE 7336	Digital Communications	
EECE 7337	Information Theory	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7352	Computer Architecture	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Networks Systems and Applications)	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	
<b>Computer Science</b>		
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 6620	Fundamentals of Cloud Computing	
CS 6650	Building Scalable Distributed Systems	
CS 7610	Foundations of Distributed Systems	

**Cybersecurity**

CY 6740

Network Security

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Electrical and Computer Engineering with Concentration in Communications, Control, and Signal Processing, MSECE**

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

**Excluded Courses for All MSECE Concentrations**

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with a Concentration in Communications, Control, and Signal Processing in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved communications, control, and signal processing technical courses.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Fundamental Courses**

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5576	Wireless Communication Systems	8
EECE 5666	Digital Signal Processing	
EECE 7200	Linear Systems Analysis	
EECE 7204	Applied Probability and Stochastic Processes	

**Options**

Complete one of the following options:

**COURSEWORK OPTION**

Code	Title	Hours
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

**THESIS OPTION**

Code	Title	Hours
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
<b>Concentration Courses</b>		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

In the coursework option a maximum of two courses may be taken outside of electrical and computer engineering. Thesis track students can take up to three courses outside of electrical and computer engineering.

**CONCENTRATION COURSES**

Code	Title	Hours
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5582	Making Systems Reliable—An Introduction to Coding Theory	
EECE 5610	Digital Control Systems	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	
EECE 5666	Digital Signal Processing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications for 6G)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators )	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7200	Linear Systems Analysis	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7215	Introduction to Distributed Intelligence	
EECE 7223	Riemannian Optimization	
EECE 7310	Modern Signal Processing	
EECE 7311	Two Dimensional Signal and Image Processing	
EECE 7323	Numerical Optimization Methods	
EECE 7336	Digital Communications	
EECE 7337	Information Theory	

EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Current Research in Nonlinear Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering
ME 7247	Advanced Control Engineering

**BREADTH COURSES**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5554	Robotics Sensing and Navigation	
EECE 5606	Micro- and Nanofabrication	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Reinforcement Learning)	

EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7205	Fundamentals of Computer Engineering
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)

EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)
MATH 7233	Graph Theory

### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Computer Networks and Security, MSECE

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

### Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

#### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

**Master's Degree in Electrical and Computer Engineering with Concentration in Computer Networks and Security with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Networks and Security in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer networks and security technical courses.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Fundamental Courses

Code	Title	Hours
Complete 8 semester hours from the following:		
EECE 5155	Wireless Sensor Networks and the Internet of Things	8
EECE 5641	Introduction to Software Security	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7374	Fundamentals of Computer Networks	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		

#### Electives

Complete 8 semester hours from either concentration or breadth courses.	8
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### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
<b>Concentration Courses</b>		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

## Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

### CONCENTRATION COURSES

Code	Title	Hours
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5576	Wireless Communication Systems	
EECE 5640	High-Performance Computing	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Spectrum Policy Issues for Wireless Communications Innovators )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Terahertz Communications for 6G )	
EECE 5699	Computer Hardware and System Security	

EECE 6400	Special Problems in Electrical and Computer Engineering
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Wireless Communications )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (An Experimental Approach to Wireless Communications )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning and Edge Computing in Wireless Networks )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Networked XR systems )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scaled Learning-Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications )
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering
CS 6760	Privacy, Security, and Usability
CY 6740	Network Security
CS 7610	Foundations of Distributed Systems

**BREADTH COURSES**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 7800	Advanced Algorithms	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	
EECE 5666	Digital Signal Processing	

EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5693	Electromagnetic Devices for RF and Wireless Communications
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)
EECE 5698	Special Topics in Electrical and Computer Engineering (Reinforcement Learning)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7215	Introduction to Distributed Intelligence
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7352	Computer Architecture
EECE 7353	VLSI Design

EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7376	Operating Systems: Interface and Implementation
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)
MATH 7233	Graph Theory
ME 7247	Advanced Control Engineering

### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Computer Systems and Software, MSECE

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree programs in electrical and computer engineering offer in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on groundbreaking research, taught by faculty who are experts in their areas.

### Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science degree in Electrical and Computer Engineering with Concentration in Computer Systems and Software in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer systems and software technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		8
EECE 5640	High-Performance Computing	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7376	Operating Systems: Interface and Implementation	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		16
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		8

### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

### Concentration Courses

Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.	8
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### Electives

Complete 8 semester hours from either concentration or breadth courses.	8
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## Course Lists

A maximum of three courses may be taken outside of electrical and computer engineering.

### CONCENTRATION COURSES

Code	Title	Hours
EECE 5552	Assistive Robotics	
EECE 5640	High-Performance Computing	
EECE 5643	Simulation and Performance Evaluation	
EECE 5699	Computer Hardware and System Security	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7376	Operating Systems: Interface and Implementation	
EECE 7390	Computer Hardware Security	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Field Programmable Gate Arrays in the Cloud )	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	
CS 5200	Database Management Systems	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6650	Building Scalable Distributed Systems	

### BREADTH COURSES

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	

EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Systems
EECE 5665	Signal Processing for Global Navigation Satellite Systems
EECE 5666	Digital Signal Processing
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5693	Electromagnetic Devices for RF and Wireless Communications
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Reinforcement Learning)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7215	Introduction to Distributed Intelligence
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2

EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7364	Mobile and Wireless Networking
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
MATH 7233	Graph Theory
ME 7247	Advanced Control Engineering

### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms, MSECE

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

## **Excluded Courses for All MSECE Concentrations**

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

## **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### **Master's Degree in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved computer vision, machine learning, and algorithms technical courses.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## **Fundamental Courses**

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5554	Robotics Sensing and Navigation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	

## **Options**

Complete one of the following options:

### **COURSEWORK OPTION**

Code	Title	Hours
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

### **THESIS OPTION**

Code	Title	Hours
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

#### **Concentration Courses**

Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement. 8

#### **Electives**

Complete 8 semester hours from either concentration or breadth courses. 8

### **Course Lists**

A maximum of three courses may be taken outside of electrical and computer engineering.

#### **CONCENTRATION COURSES**

<b>Code</b>	<b>Title</b>	<b>Hours</b>
EECE 5360	Combinatorial Optimization	
EECE 5550	Mobile Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems )	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7150	Autonomous Field Robotics	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7323	Numerical Optimization Methods	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7337	Information Theory	
EECE 7352	Computer Architecture	
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization	
EECE 7370	Advanced Computer Vision	
EECE 7352	Computer Architecture	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning )	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics )	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Verifiable Machine Learning )	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	
CS 5100	Foundations of Artificial Intelligence	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 7800	Advanced Algorithms	
DS 5110	Introduction to Data Management and Processing	

DS 5983	Topics in Data Science	
MATH 7233	Graph Theory	
<b>BREADTH COURSES</b>		
Code	Title	Hours
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5641	Introduction to Software Security	
EECE 5643	Simulation and Performance Evaluation	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	
EECE 5666	Digital Signal Processing	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)	

EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7310	Modern Signal Processing
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
ME 7247	Advanced Control Engineering

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		

The following CS courses may not count toward any concentration within the MSECE program:

CS 5010	Programming Design Paradigm
CS 5330	Pattern Recognition and Computer Vision
CS 5340	Computer/Human Interaction
CS 5520	Mobile Application Development
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6350	Empirical Research Methods
CS 6710	Wireless Network

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics, MSECE

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

## Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

**Master's Degree in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Electromagnetics, Plasma, and Optics in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved electromagnetics, plasma, and optics technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	8

EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
A maximum of two courses may be taken outside of Electrical and Computer Engineering.		
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

### THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of Electrical and Computer Engineering.		
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
<b>Concentration Courses</b>		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

## Course Lists

### CONCENTRATION COURSES

Code	Title	Hours
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5651	Introduction to Photonic Devices	
EECE 5652	Microwave Circuits and Systems	
EECE 5654	Design and Prototyping of Optical Systems for Engineering Applications	
EECE 5692	Antennas for Wireless Communication and Sensing	
EECE 5693	Electromagnetic Devices for RF and Wireless Communications	
EECE 5697	Acoustics and Sensing	
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Magnetic Materials and Devices for Microwave Engineering )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7203	Complex Variable Theory and Differential Equations	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7284	Optical Properties of Matter	
EECE 7293	Modern Imaging	

EECE 7296	Electronic Materials
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Photonic Circuit Design for Information Processing )
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering

**BREADTH COURSES**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	
EECE 5626	Image Processing and Pattern Recognition	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5645	Parallel Processing for Data Analytics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5652	Microwave Circuits and Systems	
EECE 5665	Signal Processing for Global Navigation Satellite Systems	
EECE 5666	Digital Signal Processing	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)	

EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Reinforcement Learning)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7215	Introduction to Distributed Intelligence
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)

EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)
MATH 7233	Graph Theory
ME 7247	Advanced Control Engineering

### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence, MSECE

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

### Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the Program Requirements tab and your college administrator for more information.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved hardware and software for machine intelligence technical courses.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5644	Introduction to Machine Learning and Pattern Recognition	8
EECE 7205	Fundamentals of Computer Engineering	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of the electrical and computer engineering EECE subject code.		
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		

### Electives

Complete 8 semester hours from either concentration or breadth courses.	8
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### THESIS OPTION

Code	Title	Hours
A maximum of three courses may be taken outside of electrical and computer engineering.		
<b>Thesis</b>		
EECE 7945 Master's Project		
EECE 7990 Thesis		
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		
<b>Concentration Courses</b>		
Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

## Course Lists

### CONCENTRATION COURSES

Code	Title	Hours
CS 5180	Reinforcement Learning and Sequential Decision Making	
CS 5335	Robotic Science and Systems	
CS 7340	Theory and Methods in Human Computer Interaction	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5614	Reinforcement Learning and Decision Making Under Uncertainty	
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5641	Introduction to Software Security	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	

EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 5645	Parallel Processing for Data Analytics
EECE 5698	Special Topics in Electrical and Computer Engineering (Formal Methods for Dynamical Systems )
EECE 5699	Computer Hardware and System Security
EECE 6400	Special Problems in Electrical and Computer Engineering
EECE 7150	Autonomous Field Robotics
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7323	Numerical Optimization Methods
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Flexible Robotics )
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Human Centered Computing)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robotics)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Verifiable Machine Learning )
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering
IE 5360	Digital Manufacturing
MATH 7233	Graph Theory
PHIL 5010	AI Ethics

**BREADTH COURSES**

Code	Title	Hours
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5360	Combinatorial Optimization	
EECE 5576	Wireless Communication Systems	
EECE 5580	Classical Control Systems	
EECE 5606	Micro- and Nanofabrication	
EECE 5610	Digital Control Systems	

EECE 5626	Image Processing and Pattern Recognition
EECE 5647	Nanophotonics
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Systems
EECE 5665	Signal Processing for Global Navigation Satellite Systems
EECE 5666	Digital Signal Processing
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5693	Electromagnetic Devices for RF and Wireless Communications
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 7105	Optics for Engineers
EECE 7200	Linear Systems Analysis
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7250	Power Management Integrated Circuits
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation

EECE 7284	Optical Properties of Matter
EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7310	Modern Signal Processing
EECE 7336	Digital Communications
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
ME 7247	Advanced Control Engineering

#### EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

#### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices, MSECE

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

#### Excluded Courses for All MSECE Concentrations

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

#### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

## GORDON INSTITUTE OF ENGINEERING LEADERSHIP

### **Master's Degree in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Microsystems, Materials, and Devices in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved microsystems, materials, and devices technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Fundamental Courses

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5606	Micro- and Nanofabrication	
EECE 7201	Solid State Devices	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7353	VLSI Design	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

### THESIS OPTION

Code	Title	Hours
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

### Concentration Courses

Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.	8
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### Electives

Complete 8 semester hours from either concentration or breadth courses.	8
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## Course Lists

In the coursework option, a maximum of two courses may be taken outside of electrical and computer engineering. Thesis track students can take up to three courses outside of electrical and computer engineering.

**CONCENTRATION COURSES**

Code	Title	Hours
EECE 5161	Thin Film Technologies	
EECE 5606	Micro- and Nanofabrication	
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5651	Introduction to Photonic Devices	
EECE 5652	Microwave Circuits and Systems	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Magnetic Materials and Devices for Microwave Engineering )	
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7248	Lab for EECE 7240	
EECE 7250	Power Management Integrated Circuits	
EECE 7284	Optical Properties of Matter	
EECE 7296	Electronic Materials	
EECE 7353	VLSI Design	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Communication Electronics)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Photonic Circuit Design for Information Processing )	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	

**BREADTH COURSES**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5115	Dynamical Systems in Biological Engineering	

EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5170	Introduction to Multiferroics Materials and Systems
EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5576	Wireless Communication Systems
EECE 5580	Classical Control Systems
EECE 5610	Digital Control Systems
EECE 5626	Image Processing and Pattern Recognition
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5641	Introduction to Software Security
EECE 5642	Data Visualization
EECE 5643	Simulation and Performance Evaluation
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 5645	Parallel Processing for Data Analytics
EECE 5665	Signal Processing for Global Navigation Satellite Systems
EECE 5666	Digital Signal Processing
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680
EECE 5682	Power Systems Analysis 1
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684
EECE 5688	Analysis of Unbalanced Power Grids
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Reinforcement Learning)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electric Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7200	Linear Systems Analysis
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7211	Nonlinear Control
EECE 7213	System Identification and Adaptive Control
EECE 7214	Optimal and Robust Control
EECE 7215	Introduction to Distributed Intelligence
EECE 7224	Power Systems State Estimation
EECE 7228	Advanced Power Electronics
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation

EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
MATH 7233	Graph Theory
ME 7247	Advanced Control Engineering

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Electrical and Computer Engineering with Concentration in Power Systems, MSECE**

For program contact information, please visit this website (<https://ece.northeastern.edu/academics/graduate-studies/ms-elee/>).

The master's degree program in electrical and computer engineering offers in-depth coursework within the concentration-choice-related areas. The curriculum is integrated and intensive and is built on state-of-the-art research, taught by faculty who are experts in their areas.

## **Excluded Courses for All MSECE Concentrations**

Students cannot take excluded courses as part of the MSECE program and may not petition to take these courses, as any petition to take these courses will be automatically rejected. Courses from the following subject areas may not count toward any concentration within the MSECE program: CSYE, DAMG, INFO, TELE. Select CS courses are also excluded from all MSECE concentrations. Please see the program requirements tab and your college administrator for more information.

## **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### **Master's Degree in Electrical and Computer Engineering with Concentration in Power Systems with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Electrical and Computer Engineering with Concentration in Power Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved power systems technical courses.

## **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Fundamental Courses**

Code	Title	Hours
Complete at least 8 semester hours from the following:		
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	
EECE 5684	Power Electronics	
EECE 7200	Linear Systems Analysis	

### **Options**

Complete one of the following options:

#### **COURSEWORK OPTION**

Code	Title	Hours
<b>Concentration Courses</b>		
Complete 16 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.		
<b>Electives</b>		
Complete 8 semester hours from either concentration or breadth courses.		

#### **THESIS OPTION**

Code	Title	Hours
<b>Thesis</b>		
EECE 7945	Master's Project	4
EECE 7990	Thesis	4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

#### **Concentration Courses**

Complete 8 semester hours from the concentration course list below. Any fundamental course not used to meet the fundamental course requirement can be used toward the concentration course requirement.

8

**Electives**

Complete 8 semester hours from either concentration or breadth courses.

8

**Course Lists**

In the coursework option a maximum of two courses may be taken outside of electrical and computer engineering. Thesis track students can take up to three courses outside of electrical and computer engineering.

**CONCENTRATION COURSES**

Code	Title	Hours
EECE 5580	Classical Control Systems	
EECE 5610	Digital Control Systems	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5682	Power Systems Analysis 1	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
EECE 5688	Analysis of Unbalanced Power Grids	
EECE 5690	Electric Vehicle Power Trains	
EECE 6400	Special Problems in Electrical and Computer Engineering	
EECE 7200	Linear Systems Analysis	
EECE 7211	Nonlinear Control	
EECE 7213	System Identification and Adaptive Control	
EECE 7214	Optimal and Robust Control	
EECE 7224	Power Systems State Estimation	
EECE 7226	Modeling and Simulation of Power System Transients	
EECE 7228	Advanced Power Electronics	
EECE 7250	Power Management Integrated Circuits	
EECE 7323	Numerical Optimization Methods	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Power System Constrained Optimization)	
EECE 7400	Advanced Special Problems in Electrical and Computer Engineering	

**BREADTH COURSES**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5600	Computer Systems	
CS 6200	Information Retrieval	
CS 6220	Data Mining Techniques	
CS 6410	Compilers	
CS 6510	Advanced Software Development	
CS 6760	Privacy, Security, and Usability	
CS 7800	Advanced Algorithms	
CY 5770	Software Vulnerabilities and Security	
CY 6740	Network Security	
EECE 5115	Dynamical Systems in Biological Engineering	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5161	Thin Film Technologies	
EECE 5170	Introduction to Multiferroics Materials and Systems	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5576	Wireless Communication Systems	
EECE 5606	Micro- and Nanofabrication	

EECE 5626	Image Processing and Pattern Recognition
EECE 5639	Computer Vision
EECE 5640	High-Performance Computing
EECE 5641	Introduction to Software Security
EECE 5642	Data Visualization
EECE 5643	Simulation and Performance Evaluation
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 5645	Parallel Processing for Data Analytics
EECE 5647	Nanophotonics
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology
EECE 5652	Microwave Circuits and Systems
EECE 5665	Signal Processing for Global Navigation Satellite Systems
EECE 5666	Digital Signal Processing
EECE 5693	Electromagnetic Devices for RF and Wireless Communications
EECE 5697	Acoustics and Sensing
EECE 5698	Special Topics in Electrical and Computer Engineering (Reinforcement Learning)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Organic and Printed Electronics)
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Network Programming)
EECE 5698	Special Topics in Electrical and Computer Engineering (GNSS Signal Processing)
EECE 5698	Special Topics in Electrical and Computer Engineering (Feedback Control Systems: Applications to Unmanned Aerial Vehicles)
EECE 5698	Special Topics in Electrical and Computer Engineering (Networks: Technology, Economics, Social Interactions)
EECE 5698	Special Topics in Electrical and Computer Engineering (Photonic Devices for Communication Systems)
EECE 5698	Special Topics in Electrical and Computer Engineering (Design and Prototyping of Optical Systems for Engineering Applications)
EECE 5698	Special Topics in Electrical and Computer Engineering (Hardware and System Security)
EECE 5698	Special Topics in Electrical and Computer Engineering (Advanced Network Management)
EECE 5698	Special Topics in Electrical and Computer Engineering (Electromagnetic Devices)
EECE 7105	Optics for Engineers
EECE 7150	Autonomous Field Robotics
EECE 7201	Solid State Devices
EECE 7202	Electromagnetic Theory 1
EECE 7203	Complex Variable Theory and Differential Equations
EECE 7204	Applied Probability and Stochastic Processes
EECE 7205	Fundamentals of Computer Engineering
EECE 7215	Introduction to Distributed Intelligence
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7247	Radio Frequency Integrated Circuit Design
EECE 7270	Electromagnetic Theory 2
EECE 7271	Computational Methods in Electromagnetics
EECE 7275	Antennas and Radiation
EECE 7284	Optical Properties of Matter

EECE 7293	Modern Imaging
EECE 7296	Electronic Materials
EECE 7310	Modern Signal Processing
EECE 7323	Numerical Optimization Methods
EECE 7336	Digital Communications
EECE 7337	Information Theory
EECE 7345	Big Data and Sparsity in Control, Machine Learning, and Optimization
EECE 7346	Probabilistic System Modeling and Analysis
EECE 7352	Computer Architecture
EECE 7353	VLSI Design
EECE 7364	Mobile and Wireless Networking
EECE 7368	High-Level Design of Hardware-Software Systems
EECE 7370	Advanced Computer Vision
EECE 7374	Fundamentals of Computer Networks
EECE 7376	Operating Systems: Interface and Implementation
EECE 7390	Computer Hardware Security
EECE 7393	Analysis and Design of Data Networks
EECE 7397	Advanced Machine Learning
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Security in Large-Scale Learning-Enabled Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Deep Learning Embedded Systems)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Wireless Network Systems and Applications)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Computer Architecture)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advances in Deep Learning)
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Technologies)
MATH 7233	Graph Theory
ME 7247	Advanced Control Engineering

**EXCLUDED COURSES FOR ALL MSECE CONCENTRATIONS**

Please see your college administrator for more information.

Code	Title	Hours
Courses from the following subject areas may not count toward any concentration within the MSECE program:		
CSYE, DAMG, INFO, TELE		
The following CS courses may not count toward any concentration within the MSECE program:		
CS 5010	Programming Design Paradigm	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 5700	Fundamentals of Computer Networking	
CS 5800	Algorithms	
CS 6350	Empirical Research Methods	
CS 6710	Wireless Network	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

## Electrical and Computer Engineering Leadership, MSECEL

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Institute, in collaboration with the College of Engineering, offers the Master of Science in Electrical and Computer Engineering Leadership (MSECEL) as formal recognition of the combined focus in electrical and computer engineering technical skills and midlevel engineers' leadership acumen and broadened cross-functional capabilities. This program is offered through participation in the Gordon Engineering Leadership Program at Northeastern University and requires an additional application to the Gordon program.

Pursuing the MSECEL and the graduate certificate allows participants to:

- Enhance technical knowledge in electrical and computer engineering
- Take part in a hands-on curriculum (p. 531) taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience to a professional setting, potentially further accelerating your career.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Leadership</b>		
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
<b>Foundations</b>		
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
<b>Project</b>		
ENLR 7440	Engineering Leadership Challenge Project 1	4
ENLR 7442	Engineering Leadership Challenge Project 2	4
<b>Concentration Courses</b>		
Complete 16 semester hours from any of the approved depth/breadth course lists within any of the seven EECE concentrations. Students are encouraged to take at least three courses within the same concentration.		16

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Mechanical and Industrial Engineering

Website (<https://mie.northeastern.edu/academics/graduate-studies/>)

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334 Snell Engineering Center

617.373.2740

Mechanical engineers design, develop, and support the manufacture of machinery and devices to transmit power or to convert energy from thermal to mechanical form in order to power the modern world and its machines. Traditionally, mechanical engineers have designed and tested devices, such as heating and air-conditioning systems, machine tools, internal combustion engines, and steam power plants. Today, they also play primary roles in the development of new technologies in a variety of fields—energy conversion, solar energy utilization, environmental control, prosthetics, transportation, manufacturing, robotics, and new-materials development.

Industrial engineers design and analyze systems that include people, equipment, and materials and their interactions and performance in the workplace. An industrial engineer collects this information and evaluates alternatives to make decisions that best advance the goals of the enterprise. Industrial engineers work in manufacturing firms, hospitals, banks, public utilities, transportation, government agencies, insurance companies, and construction firms. Among the projects they undertake are design and implementation of a computer-integrated supply chain or manufacturing system, facilities planning for a variety of industries, design of a robotics system in a manufacturing environment, long-range corporate planning, development and implementation of a quality-control system, simulation analyses to improve processes and make operational decisions, design of healthcare operations to enhance patient safety and improve efficiency, productivity, and development of computer systems for information control.

## **Mission of the Department**

The mission of the Department of Mechanical and Industrial Engineering is to educate persons for professional and technical excellence; to perform research to advance the science and practice of engineering; to engage in service activities that advance the department, the university, and the profession; and to instill in ourselves and our students habits and attitudes that promote ethical behavior, professional responsibility, and careers that advance the well-being of society.

## **Academic Programs**

The Department of Mechanical and Industrial Engineering offers comprehensive research and educational programs for both Master of Science and Doctor of Philosophy students. Our cutting-edge and vibrant doctoral programs include PhDs in industrial engineering, mechanical engineering, and an interdisciplinary engineering PhD (housed in the College of Engineering). Our MS degree programs are offered in both traditional mechanical and industrial engineering, as well as data analytics engineering, energy systems, engineering management, human factors, operations research, and advanced and intelligent manufacturing. These extensive programs and concentrations allow for the selection of a degree that meets a wide variety of personal and professional goals. Graduate students work with our world-renowned faculty to achieve research experience and their career goals and have opportunities to participate in the graduate cooperative education program.

## **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (<https://graduate.northeastern.edu/programs/#/certificate/engineering.leadership/-/-/-/->).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION**

Students have the opportunity to pursue the Gordon Engineering Leadership Program (<https://graduate.northeastern.edu/program/graduate-certificate-in-engineering-leadership-5272/>) in combination with the MS degree.

### **ENGINEERING BUSINESS**

Students have the opportunity to pursue the Galante Engineering Business Certificate (<https://graduate.northeastern.edu/program/galante-engineering-business-certificate-14806/>) in combination with several MS degrees.

## **Programs**

### **Doctor of Philosophy (PhD)**

- Industrial Engineering (p. 533)
- Interdisciplinary Engineering (p. 418)
- Mechanical Engineering (p. 539)

### **Master of Science (MS)**

- Advanced and Intelligent Manufacturing (p. 542)
- Data Analytics Engineering (p. 545)
- Data Analytics Engineering—Online (p. 550)
- Human Factors (p. 550)
- Robotics (p. 554)
- Semiconductor Engineering (p. 491)

### **Master of Science in Industrial Engineering (MSIE)**

- Industrial Engineering (p. 560)

**Master of Science in Engineering Management (MSEM)**

- Engineering Management (p. 564)

**Master of Science in Energy Systems (MSEnS)**

- Energy Systems (p. 568)
- Energy Systems—Academic Link Program (p. 570)

**Master of Science in Mechanical Engineering (MSME)**

- Mechanical Engineering with Concentration in General Mechanical Engineering (p. 572)
- Mechanical Engineering with Concentration in Mechanics and Design (p. 577)
- Mechanical Engineering with Concentration in Materials Science (p. 574)
- Mechanical Engineering with Concentration in Mechatronics (p. 579)
- Mechanical Engineering with Concentration in Thermofluids (p. 582)

**Master of Science in Operations Research (MSOR)**

- Operations Research (p. 585)

**Graduate Certificate**

- AI Applications (p. 588)
- Data Analytics Engineering (p. 589)
- Energy Systems (p. 589)
- Energy Systems Management (p. 590)
- Engineering Business (p. 591)
- Engineering Economic Decision Making (p. 592)
- Engineering Management (p. 593)
- Lean Six Sigma (p. 594)
- Renewable Energy (p. 594)
- Software Engineering Systems (p. 596)
- Sustainable Energy Systems (p. 595)
- Supply Chain Engineering Management (p. 596)
- Technology Systems Management (p. 597)

**Industrial Engineering, PhD****Requirements**

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced coursework and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants to the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements (both written and oral components) as well as all the required coursework.

**Academic and Research Advisors**

PhD students must find a research advisor within their first year of study. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Students are advised by the faculty advisor of their discipline before they select their research advisor(s). The research advisor and co-advisor (if applicable) must serve on the PhD student's oral examination, dissertation proposal, and dissertation defense committees.

**Change of Research Advisor**

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

## Course Requirements and Plan of Study

Each doctoral student, together with their research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

### DIRECT ENTRY

A typical program of study includes at least 40 semester hours of coursework beyond a bachelor's degree. Students who apply to earn a master's degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of coursework that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project.

### ADVANCED ENTRY

A typical program of study includes at least 20 semester hours of coursework beyond a master's degree.

### PHD CANDIDACY

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying requirements as well as all the required coursework.

## Doctoral Qualifying Requirements

**Doctoral qualifying requirements framework:** The goal of the Doctoral Qualifying Examination is to: test a student's knowledge in fundamental topics; to gauge the student's potential to conduct independent research; and to provide opportunities for feedback to the student.

The Doctoral Qualifying Examination will be administered by a committee of at least three members, with a minimum of two who are full-time faculty members in the MIE department. The exam comprises both a written and an oral portion, with specifics determined by the faculty of each concentration. Complete details are provided to students in the PhD Qualifying Requirement Guidelines on the MIE department graduate website (<https://mie.northeastern.edu/academics/graduate-studies/>).

Upon successfully completing both the written and oral components in addition to all the necessary coursework, as specified by the student's concentration, the student will be designated as a PhD candidate.

### Appeal Procedure

The doctoral qualifying requirements process provides means for reevaluation for students who fail one or more components to appeal the Graduate Affairs Committee decision. All communications related to these should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's performance.

## PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form with their research advisor(s) and submit any supporting documents. Annual reviews will be filed with the MIE Department of Graduate Affairs.

## PhD Students Changing Their Program

PhD students who, for any reason, decide to change their degree program (i.e., from PhD in ME to PhD in IE or vice versa) must satisfy the doctoral qualifying requirements (based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids)).

## Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering interdisciplinary PhD program with the MIE department as their home department must satisfy the MIE doctoral qualifying requirements. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD Interdisciplinary Engineering program with MIE as the primary affiliation.

## Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 18 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

## Dissertation Course Requirements

Upon successful completion of the doctoral qualifying requirements as well as all the required coursework, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (IE 9990) and Dissertation Term 2 (IE 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (IE 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed.

Students may not register for Dissertation Continuation (IE 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (IE 9990) and Dissertation Term 2 (IE 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Candidacy Preparation—Doctoral (IE 8960), in a section for which their research or academic advisor is listed as the instructor in the online registration system.

### **Final Oral (Dissertation Defense) Examination**

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is appropriate for formal presentation and after completion of all other PhD requirements, including all the coursework approved in the final program of study. The objective of the exam is for the candidate to present and defend the results of the dissertation research and to demonstrate depth of knowledge and significant expertise in the area of that research under questioning from the dissertation committee and other attendees.

The exam shall be publicly advertised **at least one week in advance** and all faculty members may attend and participate. At the conclusion of the presentation and subsequent questions period, the dissertation committee will convene to determine the outcome. The committee may recommend that the candidate be awarded the PhD or may require additional research and/or modifications of the dissertation. In some cases, candidates may be asked to present an additional final oral dissertation defense.

### **Residency Requirement**

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of dissertation.

### **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### **Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

### **Core Requirements**

Code	Title	Hours
<b>Recommended Courses</b>		
Note: Semester hours can be counted toward coursework component with advisor approval.		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
<b>Approved Coursework</b>		
Requires 40 semester hours of coursework.		40

### **Dissertation**

Code	Title	Hours
Complete the following (must register in two consecutive semesters, which may include full summer term):		
IE 9990	Dissertation Term 1	
IE 9991	Dissertation Term 2	

### **Program Credit/GPA Requirements**

40 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Master's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)

Annual review

Dissertation committee formation

Dissertation proposal

Dissertation defense

### General Requirements

Code	Title	Hours
<b>Recommended Courses</b>		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
<b>Approved Coursework</b>		
Requires 20 semester hours of coursework. Please consult your faculty advisor for acceptable courses.		20

### Dissertation Courses

Code	Title	Hours
Complete the following two courses. Must register in two consecutive semesters (may include full summer term):		
IE 9990	Dissertation Term 1	
IE 9991	Dissertation Term 2	

### Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

## Interdisciplinary Engineering, PhD

130 Snell Engineering Center  
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

### Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 410)
- Department of Chemical Engineering (p. 425)

- Department of Civil and Environmental Engineering (p. 440)
- Department of Electrical and Computer Engineering (p. 469)
- Department of Mechanical and Industrial Engineering (p. 531)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary engineering PhD requires the commitment by a faculty member at Northeastern to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

### **Qualifying Examination and Degree Candidacy**

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

### **Dissertation**

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

### **Residency Requirement**

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

### **Language Requirement**

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

### **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### **Direct Entry**

Complete all requirements listed below unless otherwise indicated.

### **Milestones**

Doctoral qualifying exams (both written comprehensive and oral area exams)  
Annual review  
Dissertation committee formation  
Dissertation proposal  
Dissertation defense

### **Requirements**

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		

## Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Advanced Entry

Complete all requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

### Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		20

## Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

20 total semester hours required  
Minimum 3.000 GPA required

### Mechanical Engineering, PhD

#### Requirements

The PhD is awarded to students who demonstrate high academic achievement and research competence in the fields of mechanical engineering. To earn a PhD, a student must complete an approved, rigorous program of advanced coursework and submit and defend an original dissertation of independent research. The Department of Mechanical and Industrial Engineering expects all successful doctoral candidates to show depth of knowledge and research innovation in their chosen field of specialization.

The MIE department admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements (both written and oral components) as well as all the required coursework.

#### Academic and Research Advisors

PhD students must find a research advisor within their first year of study. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Students are advised by the faculty advisor of their discipline before they select their research advisor(s). The research advisor and co-advisor (if applicable) must serve on the PhD student's oral examination, dissertation proposal, and dissertation defense committees.

#### Change of Research Advisor

Students who wish to change their research advisor need to use the MIE petition form to make that request. The petition form must be signed by the student and by the student's current and future research advisor. The signed petition form should then be submitted to the MIE department for further processing.

#### Course Requirements and Plan of Study

Each doctoral student, together with their research advisor, should develop an initial program during the first semester of study. The final program is also subject to the approval of the dissertation committee, who will add the program of study to the student's record upon admission to doctoral candidacy.

#### DIRECT ENTRY

A typical program of study includes at least 40 semester hours of coursework beyond a bachelor's degree. Students who choose to get a master's degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours to earn a master's degree and an additional 20 semester hours in order to earn a PhD). The 32 semester hours of coursework that apply toward the master's degree may include up to 8 semester hours of thesis or 4 semester hours of project.

#### ADVANCED ENTRY

A typical program of study includes at least 20 semester hours of coursework beyond a master's degree.

#### PHD CANDIDACY

To qualify as a doctoral candidate, a doctoral student must successfully complete the doctoral qualifying requirements as well as all the required coursework.

#### Doctoral Qualifying Requirements

##### DOCTORAL QUALIFYING REQUIREMENTS FRAMEWORK

The goals of the Doctoral Qualifying Examination are to test a student's knowledge in fundamental topics; to gauge the student's potential to conduct independent research; and to provide opportunities for feedback to the student.

The Doctoral Qualifying Examination will be administered by a committee of at least three members, with a minimum of two who are full-time faculty members in the MIE department. The exam comprises both a written and an oral portion, with specifics determined by the faculty of each concentration. Complete details are provided to students in the PhD Qualifying Requirement Guidelines on the MIE department graduate website (<https://mie.northeastern.edu/academics/graduate-studies/>).

Upon successfully completing both the written and oral components in addition to all the necessary coursework, as specified by the student's concentration, the student will be designated as a PhD candidate.

#### APPEAL PROCEDURE

The doctoral qualifying requirements process provides means for reevaluation for students who fail one or more components to appeal the Graduate Affairs Committee decision. All communications related to these should be coordinated through the student's research advisor. Only the student's research advisor may request the MIE Graduate Affairs Committee to reevaluate the student's performance.

## PhD Students Annual Review

All PhD students in the MIE department must complete the PhD Students Annual Review form with their research advisor(s) and submit any supporting documents. Annual reviews will be filed with the MIE Department of Graduate Affairs.

## PhD Students Changing Their Program

PhD students who, for any reason, decide to change their degree program (i.e., from PhD in ME to PhD in IE or vice versa) must satisfy the doctoral qualifying requirements (based on the student's new major research area (i.e., industrial engineering, materials, mechanics, mechatronics, or thermofluids).

## Interdisciplinary PhD Students with MIE as the Home Department

Students pursuing the College of Engineering interdisciplinary PhD program with the MIE department as their home department must satisfy the MIE doctoral qualifying requirements. Students dismissed from the ME or IE PhD programs in the MIE department cannot enroll in the PhD in Interdisciplinary Engineering program with MIE as the primary affiliation.

## Dissertation Proposal Preparation and Presentation Timing

Students must present their dissertation proposal no more than 18 months after successfully completing the oral exam. In addition, the presentation of the dissertation proposal and the actual dissertation defense (see below) shall be no less than 6 months apart. The student's dissertation committee will invite any additional faculty deemed appropriate to that field; this dissertation committee will then conduct the dissertation proposal session. Each student's dissertation committee must be comprised of at least three members, including the research advisor. At least two of those three members must be full-time MIE faculty members. At least three committee members should hold a PhD and at least two shall be Northeastern University faculty. The chair of the dissertation committee shall be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee.

## Dissertation Course Requirements

Upon successful completion of the doctoral qualifying requirements as well as all the required coursework, the doctoral candidate, in consultation with their research advisor, must register in two consecutive semesters (may include full summer term) for Dissertation Term 1 (ME 9990) and Dissertation Term 2 (ME 9991). Upon completion of this sequence, the student must then register for Dissertation Continuation (ME 9996) in every semester (in each fall and spring term and also in the summer term if summer is the student's last semester) until the dissertation is completed.

Students may not register for Dissertation Continuation (ME 9996) until they fulfill the two-semester sequence of Dissertation Term 1 (ME 9990) and Dissertation Term 2 (ME 9991).

PhD students who have completed the majority of their coursework and not yet reached PhD candidacy should register for Candidacy Preparation—Doctoral (ME 8960), in a section for which their research or academic advisor is listed as the instructor in the online registration system.

## Final Oral (Dissertation Defense) Examination

All doctoral candidates must pass a final oral exam. This exam will be scheduled once the dissertation committee agrees that the candidate's research is at a stage where it is appropriate for formal presentation and after completion of all other PhD requirements, including all the coursework approved in the final program of study. The objective of the exam is for the candidate to present and defend the results of the dissertation research and to demonstrate depth of knowledge and significant expertise in the area of that research under questioning from the dissertation committee and other attendees.

The exam shall be publicly advertised **at least one week in advance** and all faculty members may attend and participate. At the conclusion of the presentation and subsequent questions period, the dissertation committee will convene to determine the outcome. The committee may recommend that the candidate be awarded the PhD or may require additional research and/or modifications of the dissertation. In some cases, candidates may be asked to present an additional final oral dissertation defense.

## Residency Requirement

After achieving PhD candidacy, the university residency requirement is satisfied by two semesters of full-time graduate registration or four semesters of part-time graduate registration. Students must be continually enrolled during the pursuit of dissertation.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Recommended Courses</b>		
Note: Semester hours can be counted toward coursework component with advisor approval.		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
<b>Approved Coursework</b>		
Requires 40 semester hours of coursework. Students who apply to earn an MS degree along the way to a PhD must complete a total of 52 semester hours (32 semester hours toward the sought MS degree and 20 semester hours beyond the earned MS degree). The 32 semester hours applied toward the master's degree may include up to 8 semester hours of MS Thesis or 4 semester hours of MS Project or approved independent study coursework. Please consult your faculty advisor for acceptable courses.		40

## Dissertation

Code	Title	Hours
Complete the following two courses (must register in two consecutive semesters, which may include full summer term):		
ME 9990	Dissertation Term 1	
ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

40 total semester hours required  
 Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Recommended Courses (semester hours can be counted toward coursework component with adviser approval)</b>		
MEIE 6830	Graduate Traineeship 1, Technical Writing and Communications	
MEIE 6860	Graduate Traineeship 2, Research Ethics and Professional Development	
<b>Approved Course Work</b>		
Requires 20 semester hours of coursework. Please consult your faculty advisor for acceptable courses.		20

## Dissertation

Code	Title	Hours
Complete the following two courses. Must register in two consecutive semesters (may include full summer term):		
ME 9990	Dissertation Term 1	
ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

## Advanced and Intelligent Manufacturing, MS

The Department of Mechanical and Industrial Engineering offers the Master of Science in Advanced and Intelligent Manufacturing to meet the growing demand for engineers, researchers, and scientists trained in advanced manufacturing and Industry 4.0 technologies. This degree program offers students an opportunity to either train for industry jobs with coursework and co-op experience or prepare for a doctoral program through coursework and research experience. The MIE department offers both core courses and elective courses required to complete the program. Students can take MS Project or MS Thesis under any MIE faculty. This program is designed for engineering and science students planning to pursue careers in advanced and smart manufacturing. The key sectors that require manufacturing professionals include automotive, aerospace, defense, appliances, computing machines, smartphones, and communication equipment. The MS in AIM program helps students acquire knowledge and skills to:

- Build digital (CAD) models of parts and products to support manual and computer-aided manufacturing
- Design, develop, and analyze traditional and advanced manufacturing processes
- Utilize additive manufacturing to produce complex parts with ease and efficiency
- Select manufacturing processes to fabricate parts and products for quality and cost
- Configure and analyze manufacturing systems for efficiency, responsiveness, and high throughput
- Understand the characteristics and challenges of nanomanufacturing processes
- Leverage Industry 4.0 technologies including Internet of Things, cloud computing, sensor analytics for advanced manufacturing
- Adopt condition-based maintenance strategies to achieve high resource utilization
- Apply automation, robotics, and artificial intelligence to make manufacturing smart and self-operational
- Use human-machine interaction tools such as augmented reality and virtual reality
- Analyze human performance in sociotechnical systems such as supply chains
- Apply data analytics methods to gain insights from design and manufacturing data

In the context of this program, the traditional manufacturing covers metal removal, forming, casting, and particulate processes. The additive manufacturing covers topics such as 3D-printed parts using different approaches. The nanomanufacturing covers fabrication as well as printing of micro and nano devices and design and creation of multifunctional materials. Intelligent manufacturing focuses on factory automation, prognostics and health management, dynamic scheduling, cloud-enabled manufacturing, and industrial Internet of Things for manufacturing performance assurance. It also leverages real-time data analytics and control systems, advanced high-fidelity models, networked data, and computation for seamless interoperation of cyber and physical assets in manufacturing facilities.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Specific Degree Requirements

Core courses for the Master of Science in Advanced and Intelligent Manufacturing provide students with a foundation in traditional and advanced materials processing, additive manufacturing, intelligent manufacturing, and digital manufacturing. Students can select electives from a wide range of fields including mechanical engineering, industrial engineering, operations research, and engineering management. Alternatively, students can also take courses outside the MIE department by seeking a prior approval from their faculty advisor or MS thesis advisor. The course curriculum is designed to prepare students for industry jobs as well as for pursuing a doctoral program in manufacturing, mechanical engineering, and industrial engineering.

## Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE

department. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945) or Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern University.

## Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering are eligible to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Advanced and Intelligent Manufacturing with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Advanced and Intelligent Manufacturing in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved industrial engineering technical courses.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete 16 semester hours from the following:		
IE 5360	Digital Manufacturing	
IE 5380	Integrated Automation	
IE 6300	Manufacturing Methods and Processes	
IE 7270	Intelligent Manufacturing	
ME 5640	Additive Manufacturing	
ME 6420	Advanced Materials and Technologies in Manufacturing	

## Restricted Elective Course

Code	Title	Hours
Complete 4 semester hours from the following:		
IE 6500	Human Performance	
ME 5240	Computer Aided Design and Manufacturing	
ME 7374	Special Topics in Mechanical Engineering (Nano and Microscale Manufacturing)	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives course list below.		

### PROJECT OPTION

Code	Title	Hours
Complete 12 semester hours from the electives course list below.		
IE 7945	Master's Project	
or ME 7945	Master's Project	
Complete 8 semester hours from the electives course list below.		
IE 7990	Thesis <sup>1</sup>	
or ME 7990	Thesis	

### THESIS OPTION

Code	Title	Hours
Complete 4 semester hours from the electives course list below.		
IE 7945	Master's Project	
or ME 7945	Master's Project	
IE 7990	Thesis <sup>1</sup>	
or ME 7990	Thesis	

Complete 4 semester hours from the electives course list below.

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Electives

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
<b>Industrial Engineering</b>		
IE 5617	Lean Concepts and Applications	
IE 6200	Engineering Probability and Statistics	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	

IE 7374	Special Topics in Industrial Engineering
IE 7615	Neural Networks and Deep Learning
IE 7945	Master's Project
IE 7990	Thesis
IE 7996	Thesis Continuation - Half-Time
<b>Operations Research</b>	
OR 7230	Probabilistic Operation Research
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7310	Logistics, Warehousing, and Scheduling
<b>Materials Engineering</b>	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
MATL 6285	Structure, Properties, and Processing of Polymeric Materials
MATL 7365	Properties and Processing of Electronic Materials
<b>Mechanical Engineering</b>	
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5645	Environmental Issues in Manufacturing and Product Use
ME 5650	Advanced Mechanics of Materials
ME 5659	Control Systems Engineering
ME 7247	Advanced Control Engineering
<b>Engineering Management</b>	
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

- <sup>1</sup> A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, Big Data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.

## Data Analytics Engineering, MS

For program contact information, please visit this website ([https://mie.northeastern.edu/academics/graduate-studies/ms-daae/#\\_ga=28171695117827619191584316293-4047061391578954920](https://mie.northeastern.edu/academics/graduate-studies/ms-daae/#_ga=28171695117827619191584316293-4047061391578954920)).

The Department of Mechanical and Industrial Engineering offers the Master of Science in Data Analytics Engineering to meet the current and projected workforce demands. This degree program offers students an opportunity to train for industry jobs or to acquire rigorous analytical skills and research experience to prepare for a doctoral program in health, security, and sustainability at Northeastern University. While the core courses for this program are offered by the College of Engineering, students can choose elective courses from diverse disciplines spread across various colleges at Northeastern. The MS degree in data analytics engineering is designed to train students with engineering, science, mathematics, and statistics backgrounds as advanced data analytics professionals and researchers who can transform large streams of data into understandable and actionable information for the purpose of making decisions. The key sectors that require analytics professionals include healthcare, smart manufacturing, supply chain and logistics, national security, defense, banking, finance, marketing, human resources, and sports.

The Master of Science in Data Analytics Engineering program helps students acquire knowledge and skills to:

- Discover opportunities to improve products, processes, systems, and enterprises through data analytics
- Apply optimization, statistical, and machine-learning methods to solve complex problems involving large data from multiple sources
- Process and explore data from a variety of sources, including Internet of Things, an integrated network of devices and sensors, customer touch points, processes, social media, and people
- Work with technology teams to design and build large and complex SQL and NoSQL databases
- Use tools and methods for data mining, Big Data processing, and data visualization to generate reports for analysis and decision making

- Create integrated views of data collected from multiple sources of an enterprise
- Understand and explain results of data analytics to decision makers
- Design and develop data analytics projects

This degree program seeks to prepare students for a comprehensive list of tasks including collecting, storing, processing, and analyzing data; reporting descriptive statistics and patterns; performing diagnostic, predictive, and prescriptive analytics; drawing conclusions and insights; making actionable recommendations; and designing and managing data analytics projects.

## **General Degree Requirements**

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, statistics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## **Specific Degree Requirements**

Core courses for the Master of Science in Data Analytics Engineering provide students with a foundation in algorithms and optimization, statistics, data and knowledge engineering, data mining, and visualization. These courses are designed to provide students with a strong understanding of probability and statistics, statistical learning, optimization methods, data mining, database design, and visualization. Students can select electives from a wide range of fields including business, finance, engineering, healthcare, manufacturing, and urban communities/cities. Elective courses provide students with the knowledge and understanding of descriptive, prescriptive, diagnostic, and predictive analytics as applied to a specific field of interest such as business, healthcare, manufacturing, and urban communities/cities. Alternatively, students can select their electives so that they can prepare for a doctoral program by taking advanced courses in mathematics, statistics, machine learning, natural language processing, and pattern recognition.

## **Academic and Research Advisors**

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty in the MIE department. However, if the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## **Plan of Study and Course Selection**

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose the project option by taking Master's Project (IE 7945) . An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## **Options for MS Students (Coursework Only, Project, or Thesis)**

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering are eligible to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 625). Please note that students pursuing the Master of Science in Data Analytics Engineering are not eligible for the Graduate Certificate in Data Analytics Engineering.

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 semester hours of advisor-approved data analytics technical courses.

### ENGINEERING BUSINESS

#### Master's Degree in Data Analytics Engineering with Graduate Certificate in Engineering Business

Students may complete a Master of Science in Data Analytics Engineering in addition to earning a Graduate Certificate in Engineering Business (p. 591). Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the data analytics engineering core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 6400 or IE 6200	Foundations for Data Analytics Engineering Engineering Probability and Statistics	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700 or DAMG 6210	Data Management for Analytics Data Management and Database Design	4
IE 7275	Data Mining in Engineering	4
OR 6205 or CS 5800	Deterministic Operations Research Algorithms	4

Note: IE 6200, IE 6700, and OR 6205 are required for students in Vancouver.

### Options

Complete one of the following options:

#### COURSEWORK OPTION <sup>1</sup>

Code	Title	Hours
	Complete 12 semester hours from the elective course list below.	12

**PROJECT OPTION**

Code	Title	Hours
IE 7945	Master's Project	4
Complete 8 semester hours from the elective course list below.*		8

\*Students in Vancouver complete IE 7280 and 4 semester hours from the approved electives below.

**THESIS OPTION<sup>2</sup>**

Code	Title	Hours
IE 7945	Master's Project *	4
IE 7990	Thesis	4
Complete 4 semester hours from the elective course list below.**		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

\*Students in Vancouver complete IE 7990 twice for a total of 8 semester hours.

\*\*Students in Vancouver complete IE 7280 in lieu of an elective.

**Optional Co-op Experience**

Code	Title	Hours
Complete the following. Students must complete ENCP 6100 to qualify for co-op experience:		
ENCP 6100	Introduction to Cooperative Education	1
ENCP 6964 or ENCP 6954 or ENCP 6955 or ENCP 6965	Co-op Work Experience Co-op Work Experience - Half-Time Co-op Work Experience Abroad - Half-Time Co-op Work Experience Abroad	0

**Elective Course List**

Any course in the following list will serve as an elective course, provided the course is offered and the student satisfied prerequisites and program requirements. Students can take electives outside this list with a prior approval from the faculty advisor.

Code	Title	Hours
<b>General Engineering</b>		
GE 5100	Product Development for Engineers	
<b>Civil Engineering and Environmental Engineering</b>		
CIVE 7100	Time Series and Geospatial Data Sciences	
<b>Computer Science</b>		
CS 5100	Foundations of Artificial Intelligence	
CS 5150	Game Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5310	Computer Graphics	
CS 5330	Pattern Recognition and Computer Vision	
CS 5335	Robotic Science and Systems	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6200	Information Retrieval	
CS 6620	Fundamentals of Cloud Computing	
<b>Data Science</b>		
DS 5010	Introduction to Programming for Data Science	
DS 5110	Introduction to Data Management and Processing	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
<b>Electrical and Computer Engineering</b>		
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
<b>Engineering Management</b>		

EMGT 5220	Engineering Project Management <sup>3</sup>
EMGT 6225	Economic Decision Making <sup>3</sup>
EMGT 6305	Financial Management for Engineers <sup>3</sup>
<b>Health Informatics</b>	
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5102	Data Management in Healthcare
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5301	Evaluating Health Technologies
HINF 6202	Business of Healthcare Informatics
HINF 6240	Improving the Patient Experience through Informatics
HINF 6335	Management Issues in Healthcare Information Technology
HINF 6400	Introduction to Health Data Analytics
<b>Industrial Engineering</b>	
IE 5400	Healthcare Systems Modeling and Analysis
IE 6300	Manufacturing Methods and Processes
IE 6500	Human Performance
IE 7200	Supply Chain Engineering <sup>3</sup>
IE 7215	Simulation Analysis <sup>3</sup>
IE 7270	Intelligent Manufacturing
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7295	Applied Reinforcement Learning in Engineering <sup>3</sup>
IE 7300	Statistical Learning for Engineering
IE 7350	Sociotechnical Systems: Computational Models for Design and Policy
IE 7500	Applied Natural Language Processing in Engineering <sup>3</sup>
IE 7615	Neural Networks and Deep Learning <sup>3</sup>
<b>Information Systems</b>	
INFO 7390	Advances in Data Sciences and Architecture
<b>Mathematics</b>	
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7234	Optimization and Complexity
MATH 7243	Machine Learning and Statistical Learning Theory 1
MATH 7340	Statistics for Bioinformatics
MATH 7342	Mathematical Statistics
MATH 7343	Applied Statistics
MATH 7344	Regression, ANOVA, and Design
<b>Network Science</b>	
NETS 6116	Network Science 2
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
<b>Operations Research</b>	
OR 6500	Metaheuristics and Applications <sup>3</sup>
OR 7230	Probabilistic Operation Research <sup>3</sup>
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling
<b>Physics</b>	
PHYS 5116	Network Science 1
<b>Public Policy and Urban Affairs</b>	
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities

PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

## Program Credit/GPA Requirements

32 total semester hours required (33 with optional co-op)

Minimum 3.000 GPA required

- 1 Coursework option is not available to students in Vancouver.
- 2 A thesis is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship. The thesis topic should cover one or more of the areas from statistics, mathematics, optimization, data mining, machine learning, database design, Big Data, visualization tools, or forecasting methods. The thesis should train students for research in data and operations analytics and/or prepare them for a doctoral program.
- 3 Approved elective for students in Vancouver.

## Data Analytics Engineering, MS—Online

Prepare for a career on the frontier of data analytics, with the Online Master of Science in Data Analytics Engineering. Whether you're an experienced engineer or brand-new to data analytics, this program will immerse you in specializations such as data visualization, database design, and data mining, giving you the opportunity to obtain the skills to bridge the gap between raw data and actionable insights.

Once you've mastered essential data analytics techniques such as data normalization and data mapping—and become proficient in multiple programming languages such as R, SQL, and Python—you'll be ready to take on roles like predictive modeling analyst, advanced software engineer, data integration engineer, and more to help shape the evolution of data as a transformative force in modern society.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
IE 6400	Foundations for Data Analytics Engineering	4
IE 6600	Computation and Visualization for Analytics	4
IE 6700	Data Management for Analytics	4
IE 7275	Data Mining in Engineering	4
OR 6205	Deterministic Operations Research	4

### Additional Requirements

Code	Title	Hours
Complete 12 semester hours from the following:		12
IE 6750	Data Warehousing and Integration	
IE 7300	Statistical Learning for Engineering	
IE 7500	Applied Natural Language Processing in Engineering	
IE 7615	Neural Networks and Deep Learning	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Human Factors, MS

Website (<https://mie.northeastern.edu/academics/graduate-studies/ms-hf/>)

This program addresses the growing need for engineering professionals trained in advanced human factors who can utilize human factors theories, procedures, and empirically derived knowledge into understandable and actionable information for use in the design and evaluation of a wide variety of products and systems. The key sectors demanding human factors professionals include transportation, healthcare, robotics, manufacturing, computer, consumer products, social, and organizational and military issues. The core courses of the Master of Science in Human Factors program are built on the foundations of human factors and ergonomics, probabilities and statistics, etc. Topics from these foundation areas are integrated to create human factors for engineering applications. Students can select their elective or breadth courses from a wide range of fields. The program seeks to prepare students for a comprehensive set of human-factors-related professional positions.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework, but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to substitute a different course for a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## Options for MS Students (Coursework Only, Project, or Thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Human Factors with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Human Factors in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge

project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved human factors technical courses.

## **ENGINEERING BUSINESS**

### **Master's Degree in Human Factors with Graduate Certificate in Engineering Business**

Students may complete a Master of Science in Human Factors in addition to earning a Graduate Certificate in Engineering Business (p. 591). Students must apply and be admitted to the Galante Engineering Business Program (<https://galante.sites.northeastern.edu/>) in order to pursue this option. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the human factors core courses and 16 semester hours from the outlined business-skill curriculum.

## **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## **Core Requirements**

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
IE 6500	Human Performance	4
IE 7280	Statistical Methods in Engineering	4
IE 7315	Human Factors Engineering	4

## **Options**

Complete one of the following options:

### **COURSEWORK OPTION**

Code	Title	Hours
	Complete 16 semester hours from the course list below. (p. 552)	16

### **PROJECT OPTION**

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below. (p. 552)		12

### **THESIS OPTION<sup>1</sup>**

Code	Title	Hours
IE 7945	Master's Project	4
IE 7990	Thesis	4
Complete 8 semester hours from the course list below. (p. 552)		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## **Course List**

Code	Title	Hours
Any course in the following list will fulfill the coursework option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the faculty advisor.		
<b>College of Engineering</b>		
CIVE 7388	Special Topics in Civil Engineering (Urban Informatics and Processing)	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
EMGT 6600	Engineering Team Performance	
GE 5010	Customer-Driven Technical Innovation for Engineers	

GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
IE 5137	Computational Modeling in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5617	Lean Concepts and Applications
IE 5630	Biosensor and Human Behavior Measurement
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics
The following courses are available to students who concurrently enroll in the Graduate Certificate in Engineering Leadership (p. 609)	
ENLR 5121	Engineering Leadership 1
ENLR 5122	Engineering Leadership 2
ENLR 5131	Scientific Foundations of Engineering 1
ENLR 5132	Scientific Foundations of Engineering 2
ENLR 7440	Engineering Leadership Challenge Project 1
ENLR 7442	Engineering Leadership Challenge Project 2
<b>College of Social Sciences and Humanities</b>	
ECON 7200	Topics in Applied Economics
ECON 7251	International Finance
<b>College of Science</b>	
PSYC 5180	Quantitative Methods 1
PSYC 5181	Quantitative Methods 2
PSYC 7300	Advanced Quantitative Analysis
PSYC 7301	Research Methodologies Psychology
<b>Bouvé College of Health Sciences</b>	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing
EXSC 5220	Advanced Exercise Physiology
<b>Khoury College of Computer Sciences</b>	
CS 5340	Computer/Human Interaction
CS 6350	Empirical Research Methods
<b>College of Arts, Media and Design</b>	
ARTG 5150	Information Visualization Principles and Practices
ARTG 5310	Visual Cognition
ARTG 5330	Visualization Technologies 1: Fundamentals
ARTG 5600	Experience Design Studio 1: Principles
ARTG 5610	Design Systems
ARTG 5640	Prototyping for Experience Design
<i>Design Research Methods</i>	
ARTG 6310	Design for Behavior and Experience
GSND 6240	Exploratory Concept Design
GSND 6250	Spatial and Temporal Design
GSND 6330	Player Experience
GSND 6340	Biometrics for Design
<b>D'Amore-McKim School of Business</b>	
ENTR 6219	Financing Ventures from Early Stage to Exit

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Thesis option is required for all students who receive financial support from Northeastern University in the form of a research, teaching, or tuition assistantship.

## Robotics, MS

For program contact information, please visit this website (<https://coe.northeastern.edu/academic-programs/ms-robo/>).

The multidisciplinary Master of Science program in robotics is offered by the College of Engineering and the Khoury College of Computer Sciences. The program is designed to provide students comprehensive training in algorithms, sensors, control systems, and mechanisms used in robotics.

In this degree program, students will be admitted (as of Spring 2025) to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the colleges as follows:

- Computer Science—Khoury College of Computer Sciences
- Electrical and Computer Engineering—College of Engineering
- Mechanical Engineering—College of Engineering

Students will follow all policies associated with their home college.

### Gordon Institute of Engineering Leadership

#### Master's Degree in Robotics with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Robotics in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 40-semester-hour degree and certificate will require 24 semester hours of advisor-approved robotics technical courses.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

Code	Title	Hours
<b>Mechanical Engineering</b>		
ME 5250	Robot Mechanics and Control	4
ME 5659	Control Systems Engineering	
<b>Electrical and Computer Engineering</b>		
EECE 5550	Mobile Robotics	4
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
<b>Computer Science</b>		
CS 5180	Reinforcement Learning and Sequential Decision Making	4
CS 5335	Robotic Science and Systems	

### Concentrations

Complete one of the following concentrations:

- Computer Science (p. 554)—Khoury College of Computer Sciences
- Electrical and Computer Engineering (p. 555)—College of Engineering
- Mechanical Engineering (p. 555)—College of Engineering

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

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#### COMPUTER SCIENCE

Code	Title	Hours
Students in the computer science concentration follow the Khoury College of Computer Sciences co-op policies.		
<b>Required Course</b>		

Complete one additional CS course not used to fulfill the core requirements:

4

CS 5180	Reinforcement Learning and Sequential Decision Making
CS 5335	Robotic Science and Systems

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 556)

16

*Project Option*

CS 8674	Master's Project
---------	------------------

4

Complete 12 semester hours of courses from the elective course list. (p. 556)

12

*Thesis Option*

CS 8674	Master's Project
---------	------------------

4

CS 7990	Thesis
---------	--------

4

Complete 8 semester hours of courses from the elective course list. (p. 556)

8

## ELECTRICAL AND COMPUTER ENGINEERING

Code	Title	Hours
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Students in the electrical and computer engineering concentration follow the College of Engineering co-op policies.

**Required Course**

Complete one additional EECE course not used to fulfill the core requirements:

4

EECE 5550	Mobile Robotics
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EECE 5552	Assistive Robotics
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EECE 5554	Robotics Sensing and Navigation
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**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 556)

16

*Project Option*

EECE 7945	Master's Project
-----------	------------------

4

Complete 12 semester hours of courses from the elective course list. (p. 556)

12

*Thesis Option*

EECE 7945	Master's Project
-----------	------------------

4

EECE 7990	Thesis
-----------	--------

4

Complete 8 semester hours of courses from the elective course list. (p. 556)

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## MECHANICAL ENGINEERING

Code	Title	Hours
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Students in the mechanical engineering concentration follow the College of Engineering co-op policies.

**Required Course**

Complete one additional ME course not used to fulfill the core requirements:

4

ME 5250	Robot Mechanics and Control
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ME 5659	Control Systems Engineering
---------	-----------------------------

**Complete one of the following options:**

*Coursework Option*

Complete 16 semester hours of courses from the elective course list. (p. 556)

16

*Project Option*

ME 7945	Master's Project
---------	------------------

4

Complete 12 semester hours of courses from the elective course list. (p. 556)

12

*Thesis Option*

ME 7945	Master's Project
---------	------------------

4

ME 7990	Thesis
---------	--------

4

Complete 8 semester hours of courses from the elective course list. (p. 556)

8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## **Elective Course List**

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites.

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CS 5097	Mixed Reality	
CS 5100	Foundations of Artificial Intelligence	
CS 5170	Artificial Intelligence for Human-Computer Interaction	
CS 5330	Pattern Recognition and Computer Vision	
CS 5340	Computer/Human Interaction	
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6350	Empirical Research Methods	
CS 7140	Advanced Machine Learning	
CS 7150	Deep Learning	
CS 7180	Special Topics in Artificial Intelligence	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5554	Robotics Sensing and Navigation	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5642	Data Visualization	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7150	Autonomous Field Robotics	
EECE 7323	Numerical Optimization Methods	
EECE 7337	Information Theory	
EECE 7370	Advanced Computer Vision	
EECE 7397	Advanced Machine Learning	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Legged Robots)	
IE 6500	Human Performance	
IE 7280	Statistical Methods in Engineering	
IE 7315	Human Factors Engineering	
IE 7615	Neural Networks and Deep Learning	
ME 5240	Computer Aided Design and Manufacturing	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 6250	Wearable Robotics	
ME 7247	Advanced Control Engineering	
PT 5170	Motor Control	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 7005	Experimental Design and Applied Statistics	
PT 7020	Technologies in Movement and Rehabilitation Science	

## Semiconductor Engineering, MS

**Admissions to this program begin Fall 2025.**

The Master of Science in Semiconductor Engineering, offered by the Institute for NanoSystems Innovation—along with the Department of Electrical and Computer Engineering, the Department of Mechanical and Industrial Engineering, and the Department of Chemical Engineering in the College of Engineering—and the D'Amore-McKim School of Business, is designed to meet the burgeoning demand for skilled professionals in the semiconductor industry. This cutting-edge program aims to equip students with the knowledge and skills necessary to excel in this rapidly evolving field.

The national landscape is witnessing a significant uptick in interest in expanding the talent pool within the semiconductor sector, particularly following the enactment of the U.S. CHIPS and Science Act of 2022. This pivotal legislation has catalyzed a marked increase in the demand for engineers, drawing considerable attention from a wide array of companies to the semiconductor industry. There is a need for skilled workers to build new plants to increase and localize manufacturing capacity, design chips, and the tools that make the chips. This program is strategically positioned to address this growing need, offering a comprehensive educational experience that prepares our graduates to lead and innovate in this critical domain.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>NanoSystems</b>		
Complete one of the following:		
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
<b>Manufacturing</b>		
Complete one of the following:		
EECE 5606	Micro- and Nanofabrication	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5630	Nano- and Microscale Manufacturing	
<b>Innovation</b>		
Complete four semester hours from the following. Students may not meet this requirement solely with directed study coursework:		
BUSN 6379	Entrepreneurial Ecosystems	
BUSN 6389	Leading Global Virtual Innovation Teams	
CHME 5976	Directed Study	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
INNO 6200	Enterprise Growth and Innovation	
ME 5976	Directed Study	

### Concentrations

Complete one of the following concentrations:

- Devices and NanoSystems (p. 492)
- Materials and Manufacturing (p. 493)

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**DEVICES AND NANOSYSTEMS**

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		
EECE 5606	Micro- and Nanofabrication	
EECE 5651	Introduction to Photonic Devices	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
EECE 7250	Power Management Integrated Circuits	
EECE 7353	VLSI Design	
Complete one of the following options for 12 semester hours:		
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 493)		
<i>Project Option</i>		
EECE 7945	Master's Project	
Complete 8 semester hours from the restricted electives course list. (p. 493)		
<i>Thesis Option</i>		
EECE 7945	Master's Project	
EECE 7990	Thesis	
Complete 4 semester hours from the restricted electives course list. (p. 493)		

**MATERIALS AND MANUFACTURING CONCENTRATION**

Code	Title	Hours
Complete two of the following not used to complete other requirements of this program:		
CHME 5105	Materials Characterization Techniques	
IE 6200	Engineering Probability and Statistics	
IE 7270	Intelligent Manufacturing	
MATL 7365	Properties and Processing of Electronic Materials	
ME 5245	Mechatronic Systems	
ME 5620	Fundamentals of Advanced Materials	
ME 5630	Nano- and Microscale Manufacturing	
Complete one of the following options for 12 semester hours:		
<i>Coursework Option</i>		
Complete 12 semester hours from the restricted electives course list. (p. 493)		
<i>Project Option</i>		
ME 7945	Master's Project	
or CHME 7945	Master's Project	
or IE 7945	Master's Project	
Complete 8 semester hours from the restricted electives course list. (p. 493)		
<i>Thesis Option</i>		
ME 7945	Master's Project	
or CHME 7945	Master's Project	
or IE 7945	Master's Project	
ME 7990	Thesis	
or CHME 7990	Thesis	
or IE 7990	Thesis	
Complete 4 semester hours from the restricted electives course list. (p. 493)		

## Restricted Electives Course List

Any course in the following elective lists will fulfill the restricted elective requirement, provided the course has not already been applied to fulfill core requirements of this program and provided the student satisfies prerequisites. Students can take electives outside of these lists with prior approval from the faculty advisor.

Code	Title	Hours
<b>Elective Courses in Engineering and Science</b>		
CHME 5105	Materials Characterization Techniques	
CHME 5510	Fundamentals in Process Safety Engineering	
CHME 5621	Electrochemical Engineering	
CHME 5642 and CHME 5643	Photochemistry Fundamentals and Applications and Photochemistry Lab	
CHME 5683	Introduction to Polymer Science	
CHME 5699	Special Topics in Chemical Engineering (BioMEM Systems)	
CHME 5699	Special Topics in Chemical Engineering (Carbon Capture Storage and Utilization)	
CHME 7340	Chemical Engineering Kinetics	
EECE 5606	Micro- and Nanofabrication	
EECE 5608	Magnetic Materials for Next-Generation Electronics	
EECE 5612	Statistical Inference: An Introduction for Engineers and Data Analysts	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 5647	Nanophotonics	
EECE 5649	Design of Analog Integrated Circuits with Complementary Metal-Oxide-Semiconductor Technology	
EECE 5651	Introduction to Photonic Devices	
EECE 5652	Microwave Circuits and Systems	
EECE 5698	Special Topics in Electrical and Computer Engineering (Biomedical Microsystems)	
EECE 5698	Special Topics in Electrical and Computer Engineering (Introduction to Quantum Engineering)	
EECE 7201	Solid State Devices	
EECE 7240 and EECE 7248	Analog Integrated Circuit Design and Lab for EECE 7240	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244 or ME 6260	Introduction to Microelectromechanical Systems (MEMS) Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7247	Radio Frequency Integrated Circuit Design	
EECE 7250	Power Management Integrated Circuits	
EECE 7296	Electronic Materials	
EECE 7353	VLSI Design	
EECE 7368	High-Level Design of Hardware-Software Systems	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Advanced Radio Frequency Passive Tech)	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering (Low Power Integrated Circuits Design)	
IE 5617	Lean Concepts and Applications	
IE 5137	Computational Modeling in Industrial Engineering	
IE 6200	Engineering Probability and Statistics	
IE 6300	Manufacturing Methods and Processes	
IE 6700	Data Management for Analytics	
IE 7200	Supply Chain Engineering	
IE 7270	Intelligent Manufacturing	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
MATL 6250	Soft Matter	

MATL 6290	Fundamentals of Nanostructured Materials
MATL 7365	Properties and Processing of Electronic Materials
ME 5240	Computer Aided Design and Manufacturing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5520	Fundamentals and Applications of Optics and Photonics
ME 5600	Materials Processing and Process Selection
ME 5620	Fundamentals of Advanced Materials
ME 5630	Nano- and Microscale Manufacturing
ME 5640	Additive Manufacturing
ME 5645	Environmental Issues in Manufacturing and Product Use
PHYS 5114	Physics and Applications of Quantum Materials
PHYS 5125	Advanced Quantum Mechanics
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 5318	Principles of Experimental Physics
PHYS 5352	Quantum Computation and Information

**Elective Courses in Innovation**

A maximum of 4 semester hours may be taken from the following:

FINA 6309	Foundations of Accounting and Finance
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
HRMG 6200	Managing People and Organizations
HRMG 6230	Leading a Diverse and Inclusive Organization
HRMG 6280	The Human Side of Innovation
INNO 6200	Enterprise Growth and Innovation
MGMT 6213	Managing Ethics in the Workplace and Marketplace
MGMT 6225	Sustainability and Leadership
MGMT 6226	Sustainability and the Business Environment
MKTG 6200	Creating and Sustaining Customer Markets

FINA, HRMG, INNO, MGMT, and MKTG courses listed above are 3 semester hours, so students may take one additional 1 semester hour of courses from the list below for a total of 4 semester hours:

BUSN 6379	Entrepreneurial Ecosystems
BUSN 6389	Leading Global Virtual Innovation Teams
CHME 5976	Directed Study
ME 5976	Directed Study

**Industrial Engineering, MSIE**

Website (<https://mie.northeastern.edu/academics/graduate-studies/ms-inde/>)

The Department of Mechanical and Industrial Engineering offers comprehensive research and educational programs for students pursuing the Master of Science in Industrial Engineering. Industrial engineering applies mathematical modeling and analytical tools to make better decisions for designing and managing efficient and effective systems. IE is applied in many areas, including healthcare systems, supply chains, logistics and transportation engineering, manufacturing, sustainability, resilient systems, energy systems, and human-in-the loop systems. We partner with organizations ranging from startups to well-established corporations, to government and nongovernment organizations. For example, our supply chain resilience research is trying to understand and mitigate persistent drug shortages in the United States. Our research in healthcare systems engineering uses methods from lean Six Sigma tools to advanced mathematical models to improve system and product reliability and optimize healthcare process quality, delays, cost, efficiency, and effectiveness—national priorities. Recent healthcare applications include improvements in scheduling, readmissions, cost reductions, cancer care, and health services planning. We use stochastic and simulation modeling to study environmental issues related to green manufacturing, product recovery, and end-of-life management. We use data analytics for designing prognostics and preventive strategies for manufacturing operations. Our research and teaching together are designed to develop IE practitioners who can work, innovate, and excel in a variety of businesses. These extensive programs and coursework allow for the selection of a degree that meets a wide variety of personal and professional goals.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (IE 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from Northeastern University in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours). Students are strongly encouraged to complete 4 semester hours of Master's Project (IE 7945) followed by 4 semester hours of Thesis (IE 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based

challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved industrial engineering technical courses.

### **ENGINEERING BUSINESS**

#### **Master's Degree in Industrial Engineering with Graduate Certificate in Engineering Business**

Students may complete a Master of Science in Industrial Engineering in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the industrial engineering core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business (p. 591).

### **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

Code	Title	Hours
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
Complete 8 semester hours from the following:		
IE 5400	Healthcare Systems Modeling and Analysis	
or IE 5500	Systems Engineering in Public Programs	
or IE 7350	Sociotechnical Systems: Computational Models for Design and Policy	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7275	Data Mining in Engineering	
IE 7315	Human Factors Engineering	
or IE 6500	Human Performance	

### **Options**

Complete one of the following options:

#### **COURSEWORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

#### **PROJECT OPTION**

Code	Title	Hours
IE 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

#### **THESIS OPTION<sup>1</sup>**

Code	Title	Hours
IE 7945	Master's Project	4
IE 7990	Thesis	4
Complete 8 semester hours from the course list below.		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Course List

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.

Code	Title	Hours
<b>Computer Systems Engineering</b>		
CSYE 7280	User Experience Design and Testing	
<b>Data Analytics</b>		
DA 5020	Collecting, Storing, and Retrieving Data	
<b>Data Architecture Management</b>		
DAMG 6210	Data Management and Database Design	
<b>Engineering Management</b>		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
<b>General Engineering</b>		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
<b>Industrial Engineering</b>		
IE 5137	Computational Modeling in Industrial Engineering	
IE 5617	Lean Concepts and Applications	
IE 6300	Manufacturing Methods and Processes	
IE 6400	Foundations for Data Analytics Engineering	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7270	Intelligent Manufacturing	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7295	Applied Reinforcement Learning in Engineering	
IE 7300	Statistical Learning for Engineering	
IE 7315	Human Factors Engineering	
IE 7350	Sociotechnical Systems: Computational Models for Design and Policy	
<b>Operations Research</b>		
OR 6500	Metaheuristics and Applications	
OR 7230	Probabilistic Operation Research	
OR 7235	Inventory Theory	
OR 7240	Integer and Nonlinear Optimization	
OR 7245	Network Analysis and Advanced Optimization	
OR 7270	Convex Optimization and Applications	
OR 7310	Logistics, Warehousing, and Scheduling	
<b>Supply Chain Management</b>		
SCHM 6213	Global Supply Chain Strategy	
SCHM 6214	Sourcing and Procurement	
SCHM 6215	Supply Chain Analytics	
SCHM 6221	Sustainability and Supply Chain Management	
SCHM 6223	Managing Healthcare Supply Chain Operations	

Or any IE or OR courses

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

- <sup>1</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Engineering Management, MSEM

The Master of Science in Engineering Management (<https://mie.northeastern.edu/academics/graduate-studies/ms-engm/>) offers graduate students an opportunity to develop both technical expertise and business competence that is in high demand among prospective technology-based employers. Industry leaders are seeking qualified and talented individuals who are not only able to guide research and design teams but also able to direct and supervise development and production processes. The combination of technical proficiency and business skills fostered in the engineering management program is designed to provide a competitive edge for graduates seeking a wide range of positions in technology-based product or service industries, as well as in comparable local, state, and federal agencies and programs.

The program was designed by experienced high-level managers and academic leaders as an option for engineers and scientists to broaden their skill sets to include management tools and techniques that are applicable to technology-based industries. Graduates of the engineering management program work as project managers or leaders of teams in technology-based industries. Upon completion of the program, students find that their acquired skills are applicable to a wide range of industries, primarily those focused upon the development of technical products and the management of technical projects.

Graduates may assist companies in bringing a product from an idea through its development phases to its introduction to the marketplace. They may also be involved in forming and managing teams for assessing cost-effectiveness, formulating strategies to improve production, or analyzing a company's supply chain. Most of these projects cannot be successfully completed without the skills of those possessing a background in management decision making and engineering expertise; therefore, the engineering management graduate is often a technical liaison to all levels of management. As a result, many of the assignments held by engineering management graduates have actually proven to be a gateway to upper-level management positions.

The current program of study can be taken on a part-time or full-time basis on-ground or online. There are four core courses required of all students, which have been formulated to satisfy the foundation requirements of economic decision making, decision-making mathematics, and project management. In addition to these required courses, the curriculum consists of electives that allow students to choose either a broad-based program of study or one centered on a particular concentration. Some students may elect to refresh or enhance their technical skills in engineering-based subjects such as information systems, computer systems engineering, or graduate courses from the traditional engineering disciplines. Other students may prefer to broaden their knowledge base by selecting coursework in management subjects such as engineering organizational psychology, financial management, logistics and warehousing, supply chain engineering, or lean systems design. Additionally, students may also elect to complete the Gordon Engineering Leadership Program as part of their engineering management degree.

One recent graduate has observed that "Northeastern's MSEM is like an MBA for engineers, with high-quality, dedicated professors who are proficient in their field yet are able to convey information in a way that's easy to understand." This graduate also noted, "My courses in project management have been key to understanding the subtleties that affect Project Managers while technical courses provide a strong background in fundamentals as well as specialty topics. My experience with co-op has been outstanding and has truly helped me further my career."

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51% or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework, but it

also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (EMGT 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

### **Options for MS Students (Coursework Only, Project, or Thesis)**

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option. Students are strongly encouraged to complete 4 semester hours of Master's Project (EMGT 7945) followed by 4 semester hours of Thesis (EMGT 7990) over two consecutive semesters.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### **Change of Program/Concentration**

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

### **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

##### **Master's Degree in Engineering Management with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved engineering management technical courses.

#### **ENGINEERING BUSINESS**

##### **Master's Degree in Engineering Management with Graduate Certificate in Engineering Business**

Students may complete a Master of Science in Engineering Management in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the engineering management core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business (p. 591).

### **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### **Core Requirements**

Complete all courses and requirements listed below unless otherwise indicated. Students may not register for more than 9 semester hours in the fall, spring, and summer terms.

Code	Title	Hours
<b>Required Courses</b>		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 8 semester hours from the course list below. (p. 566)		

### PROJECT OPTION

Code	Title	Hours
EMGT 7945 Master's Project		

Complete 4 semester hours from the course list below. (p. 566)

### THESIS OPTION<sup>1</sup>

Code	Title	Hours
EMGT 7945 Master's Project		
EMGT 7990 Thesis		

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

### ONLINE OPTION

Code	Title	Hours
Complete 8 semester hours from the course list below. (p. 566)		
Courses offered online can be found on the online course list below. (p. 568)		

## Concentration or Electives Option

A concentration is not required. Students may complete electives in lieu of a concentration.

- Digital Product Management (p. 566)
- Electives (p. 566)

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## DIGITAL PRODUCT MANAGEMENT CONCENTRATION

Code	Title	Hours
EMGT 6700 Digital Product Design and Management		
EMGT 6750 Advanced Product Management		

## ELECTIVES OPTION

Code	Title	Hours
Complete 8 semester hours from the course list below, not used to fulfil other requirements of the program. (p. 566)		

## ELECTIVE COURSE LIST

Code	Title	Hours
CSYE 7280 User Experience Design and Testing		
DAMG 6210 Data Management and Database Design		

EMGT 5300	Engineering/Organizational Psychology
EMGT 6305	Financial Management for Engineers
EMGT 6600	Engineering Team Performance
EMGT 6700	Digital Product Design and Management
ENSY 5000	Fundamentals of Energy System Integration
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
IE 5137	Computational Modeling in Industrial Engineering
IE 5374	Special Topics in Industrial Engineering
IE 5390	Structured Data Analytics for Industrial Engineering
IE 5400	Healthcare Systems Modeling and Analysis
IE 5500	Systems Engineering in Public Programs
IE 5617 and IE 5618	Lean Concepts and Applications and Recitation for IE 5617
IE 5640	Data Mining for Engineering Applications
IE 6300	Manufacturing Methods and Processes
IE 6500	Human Performance
IE 6600	Computation and Visualization for Analytics
IE 6962	Elective
IE 7200	Supply Chain Engineering
IE 7215	Simulation Analysis
IE 7270	Intelligent Manufacturing
IE 7275	Data Mining in Engineering
IE 7280	Statistical Methods in Engineering
IE 7285	Statistical Quality Control
IE 7290	Reliability Analysis and Risk Assessment
IE 7315	Human Factors Engineering
IE 7374	Special Topics in Industrial Engineering
IE 7615	Neural Networks and Deep Learning
INFO 6215	Business Analysis and Information Engineering
INFO 7245	Agile Software Development
INFO 7285	Organizational Change and IT
INFO 7385	Managerial Communications for Engineers
ME 5645	Environmental Issues in Manufacturing and Product Use
ME 6200	Mathematical Methods for Mechanical Engineers 1
OR 6500	Metaheuristics and Applications
OR 6962	Elective
OR 7230	Probabilistic Operation Research
OR 7240	Integer and Nonlinear Optimization
OR 7245	Network Analysis and Advanced Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling
OR 7374	Special Topics in Operations Research
TELE 5330	Data Networking
or any EMGT, IE, or OR courses	

**Electives Outside the College of Engineering**

A maximum of 9 semester hours may be taken from the following toward the elective requirement:

DA 5020	Collecting, Storing, and Retrieving Data
ENTR 6212	Business Planning for New Ventures
ENTR 6218	Business Model Design and Innovation
ENTR 6219	Financing Ventures from Early Stage to Exit
ENTR 6240	Emerging and Disruptive Technologies

ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
INNO 6200	Enterprise Growth and Innovation
SCHM 6211	Logistics and Transportation Management
SCHM 6213	Global Supply Chain Strategy
SCHM 6214	Sourcing and Procurement
SCHM 6215	Supply Chain Analytics
SCHM 6221	Sustainability and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations
SCHM 6224	Demand Planning and Forecasting

## Online Course List

Code	Title	Hours
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6305	Financial Management for Engineers	
ENSY 5000	Fundamentals of Energy System Integration	
IE 5640	Data Mining for Engineering Applications	
IE 6300	Manufacturing Methods and Processes	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
INFO 6215	Business Analysis and Information Engineering	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 6200	Mathematical Methods for Mechanical Engineers 1	
OR 7230	Probabilistic Operation Research	
OR 7240	Integer and Nonlinear Optimization	
OR 7310	Logistics, Warehousing, and Scheduling	

## Energy Systems, MSEneS

The Master of Science in Energy Systems (<https://mie.northeastern.edu/academics/graduate-studies/ms-enes/>) (MSEneS) integrates engineering, business, and policy into a high-level signature, multidisciplinary graduate program. Energy systems students have an opportunity to learn how to leverage business skills and public policy knowledge to accomplish their engineering goals. This program is ideal for the engineer or technical business major who is interested in pursuing an industrial or public-planning-based career.

The program's mission is to educate students in current and future energy systems technologies, to integrate energy-related technologies with the economics and financial considerations required to implement them, and to develop leadership and decision-making skills to implement energy systems in either the private or public sectors of the global market. The program will expose students to a combination of academic and corporate experience in energy systems.

The program curriculum features a multidisciplinary range of electives from five different academic colleges at Northeastern. The curriculum is flexibly designed with a set of four core courses in engineering knowledge and finance in addition to four electives. The core courses help relate these electives back to energy-related engineering concepts, including power strategies, energy renewal, sustainable energy solutions, energy storage, energy conversion, and energy efficiency. By integrating concepts across these disciplines, our students learn that implementing energy solutions requires an economic solution as well as an engineering one.

Students are exposed to business educators and practicing professionals and have the opportunity to participate in a six-month co-op experience. Practicing professionals with experience in the industry who have successfully implemented energy systems or devices and policies are actively involved in the program as adjunct professors and invited speakers. Through this curriculum and interaction with practitioners, students should be prepared to effectively integrate energy system development over a broad spectrum of technologies with the financial requirements to successfully implement them and to compete in the global energy market.

Successful graduates of the program will be involved in the decision making or policy planning that will deliver minimally polluting, energy-efficient systems to the global market. They will have the base training necessary to lead efforts within companies to plan and implement new energy-generation investments, realize energy-efficiency improvements specifically at the system level, and participate in energy and environmental markets such as cap-and-trade systems.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ENSY 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.3 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Energy Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Energy Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved energy systems technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
<b>Required Courses</b>		
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4

or FINA 6309	Foundations of Accounting and Finance	
ENSY 5000	Fundamentals of Energy System Integration	4
ENSY 5700	Renewable Energy Development	4

## Restricted Electives

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		8
CHME 5621	Electrochemical Engineering	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENSY 5650	Geologic Energy Systems for Energy Generation and Carbon Sequestration	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	

## Other Electives

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the following list below or by approval of program director.		8
CHEM 5614	Electroanalytical Chemistry	
CHEM 5651	Materials Chemistry of Renewable Energy	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
EECE 5680	Electric Drives	
EECE 5682	Power Systems Analysis 1	
EECE 5684	Power Electronics	
EMGT 5220	Engineering Project Management	
ENSY 7945	Master's Project	
ME 5690	Gas Turbine Combustion	
ME 7270	General Thermodynamics	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
SBSY 5200	Sustainable Engineering Systems for Buildings	

## Online Course List

All required courses and many electives are offered as online courses.

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Energy Systems, MSEneS—Academic Link

For program contact information, please visit the College of Engineering website (<https://mie.northeastern.edu/academics/graduate-studies/msenes/>).

Designing and implementing optimal methods to produce and utilize energy is one of the most pressing global issues today. Finding ways to implement these solutions that are sustainable and marketable is key. The energy systems Academic Link (AL) program is meant to provide engineering students who have not had any exposure to thermal sciences with the foundation skills necessary to create and implement energy solutions. Students begin the program by taking two core courses that cover topics across thermal sciences and math along with the general energy systems curriculum.

The preparatory core courses introduce students to the fundamentals that are necessary to be successful in the energy system program. All courses are integrated with our multidisciplinary energy system curriculum that integrates engineering, business, and policy. Our curriculum is flexibly designed with a set of core courses in engineering and finance complemented by a range of electives across five different academic colleges. Our core and elective courses are designed to help to prepare students to lead the efforts to implement energy systems solutions that have a long-term positive effect on businesses and communities.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## General Requirements

A minimum of 40 semester hours must be earned toward completion of the degree. A minimum grade-point average of 3.000 is required over all courses applied toward the degree.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete 20 semester hours from the following:		
EMGT 6225	Economic Decision Making	
ENSY 5050	Fundamentals of Thermal Science 1	
ENSY 5060	Fundamentals of Thermal Science 2	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5700	Renewable Energy Development	
Complete 4 semester hours from the following:		
EMGT 6305	Financial Management for Engineers	
FINA 6309	Foundations of Accounting and Finance	

## Restricted Electives List

Code	Title	Hours
Complete a minimum of 8 semester hours from the following:		
CHME 5621	Electrochemical Engineering	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENSY 5650	Geologic Energy Systems for Energy Generation and Carbon Sequestration	
ENSY 5800	Applications of Artificial Intelligence in Energy Systems	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
ME 6200	Mathematical Methods for Mechanical Engineers 1	

## Other Electives List

Code	Title	Hours
An additional 8 semester hours can either be taken from the list above or from the list below or by approval of the program director.		
		8

CHEM 5614	Electroanalytical Chemistry
CHEM 5651	Materials Chemistry of Renewable Energy
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
EECE 5680	Electric Drives
EECE 5682	Power Systems Analysis 1
EECE 5684	Power Electronics
EMGT 5220	Engineering Project Management
ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1
ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2
ENSY 7945	Master's Project
ME 5690	Gas Turbine Combustion
ME 7270	General Thermodynamics
ME 7300	Combustion and Air Pollution
ME 7305	Fundamentals of Combustion
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
SBSY 5200	Sustainable Engineering Systems for Buildings

## Online Course List

All required courses and many electives are offered as online courses.

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Mechanical Engineering with Concentration in General Mechanical Engineering, MSME

### Overview

While pursuing a Master of Science in Mechanical Engineering (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), students may choose the general mechanical engineering concentration.

### GENERAL DEGREE REQUIREMENTS

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

### PLAN OF STUDY AND COURSE SELECTION

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the

student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

#### **OPTIONS FOR MS STUDENTS (COURSEWORK ONLY, PROJECT, OR THESIS)**

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

#### **CHANGE OF PROGRAM/CONCENTRATION**

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

#### **GRADUATE CERTIFICATE OPTIONS**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

##### **Master's Degree in Mechanical Engineering with Concentration in General Mechanical Engineering with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with Concentration in General Mechanical Engineering in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanical engineering technical courses.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

Code	Title	Hours
<b>Mathematics Competency</b>		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
<b>Thermofluids Competency</b>		
Complete 4 semester hours from the following:		4
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	
<b>Mechanics/Mechatronics Combined Competency</b>		
Complete 4 semester hours from the following:		4
EECE 5610	Digital Control Systems	

EECE 5666	Digital Signal Processing
ME 5245	Mechatronic Systems
ME 5250	Robot Mechanics and Control
ME 5650	Advanced Mechanics of Materials
ME 5654	Elasticity and Plasticity
ME 5655	Dynamics and Mechanical Vibration
ME 5657	Finite Element Method 1
ME 5659	Control Systems Engineering
ME 7238	Finite Element Method 2

**Materials Competency**

Complete 4 semester hours from the following:	4
ME 5600	Materials Processing and Process Selection
ME 5620	Fundamentals of Advanced Materials
MATL 5380	Particulate Materials Processing
MATL 6250	Soft Matter
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
MATL 6285	Structure, Properties, and Processing of Polymeric Materials
or any MATL courses	

**OPTIONS**

Complete one of the following options:

**COURSEWORK OPTION**

Code	Title	Hours
Complete 16 semester hours in the following subject areas:		
ME, MATL		16

**PROJECT OPTION**

Code	Title	Hours
ME 7945	Master's Project	4
<b>Electives</b>		
ME, MATL		12

**THESIS OPTION<sup>1</sup>**

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
<b>Electives</b>		
Complete 8 semester hours in the following subject areas:		
ME, MATL		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

**Mechanical Engineering with Concentration in Materials Science, MSME**

For program contact information, please visit this website (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>).

## Overview

While pursuing a Master of Science in Mechanical Engineering (MSME), students may choose materials science as a concentration. Materials science has been the key enabler in virtually all engineering breakthroughs that have occurred from early metal ages to the present nano age. In step with the scientific development and discovery of materials, members of the mechanical and industrial engineering (MIE) faculty are involved in interdisciplinary research to further materials processing, synthesis, and design. Research areas are aligned with Northeastern University's broad initiatives of sustainability, security, and health, as well as national initiatives in manufacturing and nanotechnology. Investigations in the areas of metals/alloys, polymers, biomaterials (including biomimetics), and composites incorporating nanoscale materials make use of experimental, theoretical, and computational techniques to tailor structure-processing-property relationships in materials for specific applications. Current areas of research include controlling synthesis and assembly processes to produce well-defined atomic structures; defect engineering; manipulating atomic/microstructures and the chemistry of materials to optimize properties for next-generation structural, electronic, and energy applications; solidification and deformation processing, nanomanufacturing; and life-cycle assessments for nanocomposites/materials. Northeastern faculty and students are committed to creative thinking and engineering innovation to propel materials development to the forefront of scientific research.

### GENERAL DEGREE REQUIREMENTS

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### ACADEMIC AND RESEARCH ADVISORS

All nonthesis students are advised by the academic advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

### PLAN OF STUDY AND COURSE SELECTION

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

### OPTIONS FOR MS STUDENTS (COURSEWORK ONLY, PROJECT, OR THESIS)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### CHANGE OF PROGRAM/CONCENTRATION

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

**GRADUATE CERTIFICATE OPTIONS**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Mechanical Engineering with Concentration in Materials Science with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with Concentration in Materials Science in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved materials science technical courses.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
Complete 16 semester hours from the following:		
MATL 6250	Soft Matter	
MATL 6285	Structure, Properties, and Processing of Polymeric Materials	
MATL 7355	Thermodynamics of Materials	
ME 5600	Materials Processing and Process Selection	
ME 5620	Fundamentals of Advanced Materials	

**Options**

Complete one of the following options:

**COURSEWORK OPTION**

Code	Title	Hours
<b>Electives</b>		
ME, MATL		16

**PROJECT OPTION**

Code	Title	Hours
MATL 7945	Master's Project	4
<b>Electives</b>		
ME, MATL		12

**THESIS OPTION<sup>1</sup>**

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
<b>Electives</b>		
ME, MATL		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Program Credit/GPA Requirements

32 total semester hours required

- <sup>1</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

### Mechanical Engineering with Concentration in Mechanics and Design, MSME

#### Overview

While pursuing a Master of Science in Mechanical Engineering with Concentration in Mechanics and Design (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), the students will study the motion, deformation, and failure of solid materials in response to the action of direct forces and external fields. The students will also get a chance to conduct research with faculty and observe how these studies will lead to key engineering innovations and designs. Using complementary analytical, computational, experimental, and design tools, the M&D faculty members conduct research in the design and analysis of engineered functional materials/structures, in mechanics of adhesion and contact, and in biomechanics and mechanobiology. For example, in our biomechanics research, we strive to close the gap between function, form, and disease in the bone by using experimental and computational techniques; also, we explore the mechanics of lipid-based drug delivery vesicles. At the small length scales, we are creating a new understanding of nanomechanics, contact mechanics, tribology, MEMS, and the application of nanomaterials for energy storage systems. Our research and teaching together are designed to prepare students to understand and exploit mechanics to enable their future engineering innovations.

#### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

#### Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

#### Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

#### Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (16 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by

the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## **Change of Program/Concentration**

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

## **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### **Master's Degree in Mechanical Engineering with a Concentration in Mechanics and Design with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechanics and Design in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved mechanics and design technical courses.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## **Core Requirements**

Code	Title	Hours
<b>Mathematics Competency</b>		
Complete the following course:		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
<b>Mechanics Competency</b>		
Complete 12 semester hours from the following:		
ME 5650	Advanced Mechanics of Materials	
ME 5654	Elasticity and Plasticity	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
ME 5659	Control Systems Engineering	

## **Options**

Complete one of the following options:

### **COURSEWORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list.		

### **PROJECT OPTION**

Code	Title	Hours
ME 7945 Master's Project		

Complete 12 semester hours from the course list.

**THESIS OPTION<sup>1</sup>**

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
Complete 8 semester hours from the course list.		8
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		

**Course List**

Code	Title	Hours
Any course in the following list will fulfill the Coursework Option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the faculty advisor.		
ME 5240	Computer Aided Design and Manufacturing	
ME 5374	Special Topics in Mechanical Engineering (Fracture Mechanics and Adhesion in Biological Science)	
ME 5374	Special Topics in Mechanical Engineering (Inelasticity)	
ME 5658	Continuum Mechanics	
ME 5665	Musculoskeletal Biomechanics	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	
ME 7232	Theory of Plates and Shells	
ME 7238	Finite Element Method 2	
ME 7374	Special Topics in Mechanical Engineering	
Any other ME or MATL course		

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

**Mechanical Engineering with Concentration in Mechatronics, MSME**

While pursuing a Master of Science in Mechanical Engineering (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), students may choose mechatronics as a concentration. The term mechatronics is a combination of the words mechanics and electronics. Mechatronics is a multidisciplinary approach to product design and development, merging the principles of electrical, mechanical, computer, material, chemical, and industrial engineering. The mechatronics and systems research cluster in the MIE department is concerned with systems that are typically composed of traditional mechanical and electrical components but are rendered "intelligent" by the incorporation of sensors, actuators, and computer control systems. Our primary focus in mechatronics and systems is on intelligent and integrated systems and machines along with their practical applications ranging from manufacturing systems and robotic platforms to biological systems. Our research and teaching together are designed to prepare students to understand and exploit mechatronics to enable their future engineering innovations.

**General Degree Requirements**

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

**Academic and Research Advisors**

All non-thesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research adviser must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs

Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## **Plan of Study and Course Selection**

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## **Options for MS Students (coursework only, project, or thesis)**

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (12 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## **Change of Program/Concentration**

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## **Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### ***Master's Degree in Mechanical Engineering with a Concentration in Mechatronics with Graduate Certificate in Engineering Leadership***

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechatronics in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved mechatronics technical courses.

### **GALANTE ENGINEERING BUSINESS**

#### ***Master's Degree in Mechanical Engineering with a Concentration In Mechatronics with Graduate Certificate in Engineering Business***

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Mechatronics in addition to earning a Graduate Certificate in Engineering Business. Students must apply and be admitted to both the Mechatronics concentration and the Galante Engineering Business Program in order to pursue this option. The Engineering Business program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of core courses from the mechatronics concentration and 16 semester hours from a specific set of applicable elective graduate level mechanical engineering courses. Students should consult the program directors of the Mechatronics concentration and the Engineering Business program prior to selecting courses. The course work, along with participation in cocurricular professional development elements, earn the Graduate Certificate in Engineering Business.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Mathematics Competency</b>		
Complete 4 semester hours from the following:		
ME 6200 or IE 6200	Mathematical Methods for Mechanical Engineers 1 Engineering Probability and Statistics	4
<b>Mechanics Competency</b>		
Complete 4 semester hours from the following:		
ME 5250	Robot Mechanics and Control	
ME 5650	Advanced Mechanics of Materials	
ME 5655	Dynamics and Mechanical Vibration	
ME 5657	Finite Element Method 1	
<b>Mechatronics Concentration</b>		
ME 5245	Mechatronic Systems	4
ME 5659	Control Systems Engineering <sup>1</sup>	4
<b>Electrical Competency</b>		
Complete 4 semester hours from the following:		
EECE 5610	Digital Control Systems	
EECE 5666	Digital Signal Processing	
EECE 5680 and EECE 5681	Electric Drives and Lab for EECE 5680	
EECE 5684 and EECE 5685	Power Electronics and Lab for EECE 5684	
ME 6260	Introduction to Microelectromechanical Systems (MEMS)	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list.		

### PROJECT OPTION

Code	Title	Hours
ME 7945		
Master's Project <sup>2</sup>		
Complete 8 semester hours from the course list.		

### THESIS OPTION <sup>3</sup>

Code	Title	Hours
ME 7945		
Master's Project <sup>2</sup>		
ME 7990		
Thesis <sup>2</sup>		
Complete 4 semester hours from the course list.		

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## Course List

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	

BIOE 5810	Design of Biomedical Instrumentation
CIVE 5373	Transportation Systems: Analysis and Planning
CIVE 5699	Special Topics in Civil Engineering (Vibration-Based Structural Health Monitoring)
CS 5335	Robotic Science and Systems
CS 5340	Computer/Human Interaction
CS 7150	Deep Learning
EECE 5115	Dynamical Systems in Biological Engineering
EECE 5550	Mobile Robotics
EECE 5552	Assistive Robotics
EECE 5554	Robotics Sensing and Navigation
EECE 5576	Wireless Communication Systems
EECE 5606	Micro- and Nanofabrication
EECE 5644	Introduction to Machine Learning and Pattern Recognition
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
IE 5617	Lean Concepts and Applications
IE 5640	Data Mining for Engineering Applications
IE 6600	Computation and Visualization for Analytics
IE 6700	Data Management for Analytics
IE 7275	Data Mining in Engineering
IE 7300	Statistical Learning for Engineering
IE 7315	Human Factors Engineering
IE 7615	Neural Networks and Deep Learning
ME 5240	Computer Aided Design and Manufacturing
ME 5250	Robot Mechanics and Control
ME 5665	Musculoskeletal Biomechanics
ME 5976	Directed Study
ME 6250	Wearable Robotics
ME 7247	Advanced Control Engineering
Or any other ME or MATL course	
Or other advisor-approved courses	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> PlusOne students who have already successfully completed System Analysis and Control (ME 4555) may substitute Robot Mechanics and Control (ME 5250) for Control Systems Engineering (ME 5659). In such cases a different course must be taken to satisfy the Mechanics competency.

<sup>2</sup> It is the student's responsibility to identify a project/thesis advisor before registering for this course.

<sup>3</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Mechanical Engineering with Concentration in Thermofluids, MSME

While pursuing a Master of Science in Mechanical Engineering (<https://mie.northeastern.edu/academics/graduate-studies/ms-mece/>), students may choose thermofluids as a concentration. Some of the representative research areas under this concentration may include thermodynamics, fluid dynamics, kinetic theory of gases, and thermophoresis of aerosols; microscale heat transfer phenomena and its effects on laser beam propagation; fundamentals of combustion such as burning speed and onset of auto-ignition measurement and flame stability analysis; development of chemistry reduction such as rate-controlled constrained-equilibrium method; formation and control of combustion-generated pollutants and greenhouse gases; chemistry, transport, and abatement of air pollution; alternative energy sources; combustion-based synthesis of materials; fire propagation, containment, and extinction; nonequilibrium thermodynamics; energy and gas turbine cooling technology; turbine blade cooling; and energy-related and calorimeter studies related to pharmaceutical developments. Our research and teaching together seek to prepare students to understand and exploit thermofluids to enable their future engineering innovations.

## General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved course

work (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: course work option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

## Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

## Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the course work requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their course work needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their course work but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (ME 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

## Options for MS Students (course work only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: course work only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete the thesis option (12 semester hours).

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance and all faculty members and students may attend and participate. If deemed appropriate by the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

## Change of Program/Concentration

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.3 GPA, and have completed at least 8 semester hours of required course work in their sought program at Northeastern.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Mechanical Engineering with a Concentration in Thermofluids with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Mechanical Engineering with a Concentration in Thermofluids in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved thermofluids technical courses.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Core Courses</b>		
ME 6200	Mathematical Methods for Mechanical Engineers 1	4
ME 7270	General Thermodynamics	4
ME 7275	Essentials of Fluid Dynamics	4
ME 7285 or ME 7290	Heat Conduction and Thermal Radiation Convective Heat Transfer	4
<b>Thermofluids Concentration Course</b>		
Complete 4 semester hours from the following:		
ME 5685	Solar Thermal Engineering	4
ME 5690	Gas Turbine Combustion	4
ME 5695	Aerodynamics	4
ME 7295	Multiscale Flow and Transport Phenomena	4
ME 7300	Combustion and Air Pollution	4
ME 7305	Fundamentals of Combustion	4
ME 7310	Computational Fluid Dynamics with Heat Transfer	4

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the course list.		

### PROJECT OPTION

Code	Title	Hours
ME 7945	Master's Project	4
Complete 8 semester hours from the course list.		

### THESIS OPTION <sup>1</sup>

Code	Title	Hours
ME 7945	Master's Project	4
ME 7990	Thesis	4
Complete 4 semester hours from the course list.		

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

### COURSE LIST

Code	Title	Hours
Any course in the following list will fulfill the Coursework Option, provided the student satisfies prerequisites and program requirements. Students can take courses outside this list with prior approval from the faculty advisor.		
ME 5685	Solar Thermal Engineering	
ME 5690	Gas Turbine Combustion	
ME 5695	Aerodynamics	
ME 7295	Multiscale Flow and Transport Phenomena	
ME 7300	Combustion and Air Pollution	
ME 7305	Fundamentals of Combustion	
ME 7310	Computational Fluid Dynamics with Heat Transfer	

**PROGRAM CREDIT/GPA REQUIREMENTS**

32 total semester hours required

Minimum 3.000 GPA required

- <sup>1</sup> Thesis option is required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship.

## Operations Research, MSOR

Website (<https://mie.northeastern.edu/academics/graduate-studies/ms-opre/>)

The Department of Mechanical and Industrial Engineering (MIE) offers comprehensive research and educational programs for students pursuing the Master of Science (MS) in Operations Research (OR). OR deals with the application of scientific method to decision making. Its practitioners develop and solve mathematical and computer models of systems using optimization and statistical methods. OR methodologies are being used to improve efficiency, reduce costs, and increase profitability in all organizations whether in manufacturing, transportation, logistics and supply chains, healthcare, or financial institutions. Upon graduation, students who pursue this program may work in industry or may continue their studies by pursuing the PhD in Industrial Engineering. These extensive programs and coursework allow for the selection of a degree that meets a wide range of personal and professional goals.

### General Degree Requirements

To be eligible for admission to any of the MS degree programs, a prospective student must hold a Bachelor of Science degree in engineering, science, mathematics, or an equivalent field. Students in all master's degree programs must complete a minimum of 32 semester hours of approved coursework (exclusive of any preparatory courses) with a minimum grade-point average (GPA) of 3.000. Students can complete a master's degree by pursuing any of one of the three tracks: coursework option, project option, and thesis option. Specific degree requirements for each of these tracks can be found under the Program Requirements tab. Students may pursue any program either on a full-time or part-time basis; however, certain restrictions may apply.

### Academic and Research Advisors

All nonthesis students are advised by the faculty advisor designated for their respective concentration or program. Students willing to pursue the thesis option must first find a research advisor within their first year of study. The research advisor will guide the students' thesis work, and thesis reader(s) may be assigned at the discretion of their research advisor. The research advisor must be a full-time or jointly appointed faculty. If the research advisor is outside the MIE department, before the thesis option can be approved, a faculty member with 51 percent or more appointments in the MIE department must be chosen as co-advisor, and a petition must be filed and approved by the co-advisor and the MIE Graduate Affairs Committee. Thesis option students are advised by the faculty advisor of their concentration before they select their research advisor(s). The research advisor and co-advisor must serve as thesis readers.

### Plan of Study and Course Selection

It is recommended that all new students attend orientation sessions held by the MIE department and the Graduate School of Engineering to acquaint themselves with the coursework requirements and research activities of the department as well as with the general policies, procedures, and expectations.

In order to receive proper guidance with their coursework needs, all MS students are strongly encouraged to complete and submit a fully signed Plan of Study (PS) to the department before enrolling in second-semester courses. This form not only helps the students manage their coursework but it also helps the department to plan for requested course offerings. The PS form may be modified at any time as the students progress in their degree programs.

Students may also petition to waive a core course by demonstrating evidence of their having passed a similar approved IE or OR graduate course. In such situations, the students must first obtain approval from their academic advisor for the course(s) they are planning to substitute.

Students pursuing study or research under the guidance of a faculty member can choose project option by taking Master's Project (OR 7945). An MS project must be petitioned to the MIE Graduate Affairs Committee and approved by both the faculty member (instructor for Master's Project) and the student's academic advisor. The petition must clearly state the reason for taking the project course; a brief description of the goals; as well as the expected outcomes, deliverables, and grading scheme.

### Options for MS Students (coursework only, project, or thesis)

Students accepted into any of the MS programs in the MIE department can choose one of the three options: coursework only, project, or thesis. Please see the Program Requirements tab on the top menu of this page for more information. MS students who want to pursue project or thesis options must find, within the first year of their study, a faculty member or a research advisor who will be willing to direct and supervise a mutually agreed research project or MS thesis. Moreover, students who receive financial support from the university in the form of a research, teaching, or tuition assistantship must complete 8 semester hours of thesis option.

Students who complete the thesis option must make a presentation of their thesis before approval by the department. The MS thesis presentation shall be publicly advertised at least one week in advance, and all faculty members and students may attend and participate. If deemed appropriate by

the research advisor, other faculty members may be invited to serve as thesis readers to provide technical opinions and judge the quality of the thesis and presentation.

### **Change of Program/Concentration**

Students enrolled in any of the MIE department programs or concentrations may change their current program or concentration no sooner than the beginning of their second full-time semester of study. In order for the program or concentration change request to be considered by the MIE Graduate Affairs Committee, the student must not be in the first semester of their current program, must have a 3.300 GPA, and have completed at least 8 semester hours of required coursework in their sought program at Northeastern.

### **Graduate Certificate Options**

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 625).

#### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

##### ***Master's Degree in Operations Research with Graduate Certificate in Engineering Leadership***

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved operations research technical courses.

#### **ENGINEERING BUSINESS**

##### ***Master's Degree in Operations Research with Graduate Certificate in Engineering Business***

Students may complete a Master of Science in Operations Research in addition to earning a Graduate Certificate in Engineering Business (p. 591). Students must apply and be admitted to the Galante Engineering Business Program in order to pursue this option. The program requires the applicant to have earned or be in a program to earn a Bachelor of Science in Engineering from Northeastern University. The integrated 32-semester-hour degree and certificate will require 16 semester hours of the operations research core courses and 16 semester hours from the outlined business-skill curriculum. The coursework, along with participation in co-curricular professional development elements, earn the Graduate Certificate in Engineering Business.

### **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

Code	Title	Hours
IE 6200 or MATH 7241	Engineering Probability and Statistics Probability 1	4
OR 6205	Deterministic Operations Research	4
OR 7245 or MATH 7234	Network Analysis and Advanced Optimization Optimization and Complexity	4
OR 7230 or MATH 7341	Probabilistic Operation Research Probability 2	4

### **Options**

Select one of the following options:

#### **COURSEWORK OPTION**

Code	Title	Hours
Complete 16 semester hours from the course list below.		16

**PROJECT OPTION**

Code	Title	Hours
OR 7945	Master's Project	4
Complete 12 semester hours from the course list below.		12

**THESIS OPTION**

Code	Title	Hours
OR 7945	Master's Project	4
OR 7990	Thesis (required for all students who receive financial support from the university in the form of a research, teaching, or tuition assistantship)	4
Complete 8 semester hours from the course list below.		8
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.		

**Course List**

Code	Title	Hours
Any course in the following list will serve as an elective course, provided the course is offered and the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the faculty advisor.		
<b>Civil Engineering and Environmental Engineering</b>		
CIVE 7100	Time Series and Geospatial Data Sciences	
<b>Computer Science</b>		
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Complexity Theory	
<b>Computer Systems Engineering</b>		
CSYE 7280	User Experience Design and Testing	
<b>Data Science</b>		
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
<b>General Engineering</b>		
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
<b>Electrical and Computer Engineering</b>		
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
<b>Engineering Management</b>		
EMGT 5220	Engineering Project Management	
EMGT 5300	Engineering/Organizational Psychology	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
<b>Industrial Engineering</b>		
IE 5374	Special Topics in Industrial Engineering (Data Visualization Engineering)	
IE 5374	Special Topics in Industrial Engineering (Human Performance in Sociotechnical Systems)	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	
IE 6300	Manufacturing Methods and Processes	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	

**Mathematics**

MATH 7233	Graph Theory
MATH 7342	Mathematical Statistics

**Operations Research**

OR 6500	Metaheuristics and Applications
OR 7235	Inventory Theory
OR 7240	Integer and Nonlinear Optimization
OR 7270	Convex Optimization and Applications
OR 7310	Logistics, Warehousing, and Scheduling

Or any other IE, OR, MATH, CS, and graduate engineering courses

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**AI Applications, Graduate Certificate**

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- D'Amore-McKim School of Business
- Mills College at Northeastern

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

**Experiential Courses**

Code	Title	Hours
Complete 4 semester hours from the following:		
EDUT 6150	AI in Education	4
HLTH 5800	AI Across the Health Sciences	

IE 5640	Data Mining for Engineering Applications
JRNL 6460	AI in Media Industries
MISM 6250	Strategic AI for Business

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Data Analytics Engineering, Graduate Certificate

The Data Analytics Engineering Graduate Certificate program focuses on fundamental concepts, tools and techniques to extract information from large data sets in order to support effective decision making. This program is designed to provide opportunities for students to master high-demand data intelligence skills through hands-on experience on data storage, data retrieval, data visualization and prediction.

This four-course graduate certificate enables the students to apply the fundamentals of engineering knowledge and skills to database design, data pre- and post-processing for further analysis, data visualization for impactful infographics, statistical concepts for quantitative analysis and data mining techniques and algorithms for knowledge discovery.

Note: MS in Data Analytics students are not eligible for this graduate certificate.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
DAMG 6210	Data Management and Database Design	4
IE 6600	Computation and Visualization for Analytics	4
IE 7275	Data Mining in Engineering	4
IE 7280	Statistical Methods in Engineering	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Energy Systems, Graduate Certificate

The Graduate Certificate in Energy Systems focuses on the combination of analysis and integration of energy systems engineering technology with financial planning and attention to business aspects and effective implementation.

This four-course graduate certificate seeks to offer students opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

*Note:* Students enrolled in the master's in energy systems program are not eligible for this graduate certificate.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
ENSY 5000	Fundamentals of Energy System Integration	4

### Elective

Code	Title	Hours
Complete one of the following course, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.		
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5400	Power Plant Design and Analysis	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 5685	Solar Thermal Engineering	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Energy Systems Management, Graduate Certificate

The Graduate Certificate in Energy Systems Management focuses on the combination of analysis and integration of energy systems engineering technology with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to analyze energy systems and to propose effective and efficient technology solutions based on data-driven and economic-based decisions.

### Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
EMGT 5220	Engineering Project Management	4

### Electives

Code	Title	Hours
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.		
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	

Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.

ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	

ENSY 5400	Power Plant Design and Analysis
ENSY 5500	Smart Grid
ENSY 5585	Wind Energy Systems
ME 5685	Solar Thermal Engineering

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Engineering Business, Graduate Certificate

The Graduate Certificate in Engineering Business is part of the Galante Engineering Business Program. The Galante Engineering Business Program offers a progressive opportunity for engineering students to complement their technical engineering education with business skills. Galante is founded on the values of student engagement and leadership to strengthen interpersonal and professional skills.

The certificate seeks to provide students opportunities to apply the technical aspects of an engineering skill foundation in corporate settings through both academic and programmatic elements. Programmatic elements include workshops, speaker series, site visits, seminars, and other related personal and professional development activities as a connected cohort. These activities equip students to manage projects, lead people, make data-driven and market-based decisions, and advance economically sound initiatives.

The Galante Engineering Business Program can be completed concurrently with the following degree programs:

- MSBioE Bioengineering with Concentration in Biomedical Devices and Bioimaging (p. 421)
- MSChE Chemical Engineering (p. 435)
- MSCivE Civil Engineering with Concentration in Construction Management (p. 451)
- MS Data Analytics Engineering (p. 545)
- MSECE Electrical and Computer Engineering with Concentration in Computer Vision, Machine Learning, and Algorithms
- MSECE Electrical and Computer Engineering with Concentration in Hardware and Software for Machine Intelligence (p. 518)
- MSEM Engineering Management (p. 564)
- MS Human Factors (p. 550)
- MSIE Industrial Engineering (p. 560)
- MSME Mechanical Engineering with Concentration in Mechatronics (p. 579)
- MSOR Operations Research (p. 585)

The Graduate Certificate in Engineering Business requires 15 semester hours from four courses across three categories. Students should consult with a COE advisor whether any courses completed for this certificate may also fulfill requirements of the student's concurrent master's program.

Refer to the Galante Engineering Business Program webpage (<https://galante.sites.northeastern.edu/>) for additional details and description.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Complete four courses from at least three of the following categories. Students can only take one course outside the College of Engineering.		
BIOE 5510	Bioengineering Products/Technology Commercialization	15
BIOE 5810	Design of Biomedical Instrumentation	
BIOE 5820	Biomaterials	
ENTR 6212	Business Planning for New Ventures	

ENTR 6218	Business Model Design and Innovation
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6300	Managing a Technology-Based Business
ENTR 6340	The Technical Entrepreneur as Leader
GE 5010	Customer-Driven Technical Innovation for Engineers
GE 5020	Engineering Product Design Methodology
GE 5030	Iterative Product Prototyping for Engineers
GE 5100	Product Development for Engineers
INNO 6200	Enterprise Growth and Innovation
<b>Organizational Excellence</b>	
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design
EMGT 5300	Engineering/Organizational Psychology
EMGT 6600	Engineering Team Performance
ENTR 6250	Lean Design and Development
IE 5617	Lean Concepts and Applications
SCHM 6201	Operations and Supply Chain Management
SCHM 6223	Managing Healthcare Supply Chain Operations
PHIL 5010	AI Ethics
<b>Financial Analysis</b>	
ACCT 6200	Financial Reporting and Managerial Decision Making 1
EMGT 5220	Engineering Project Management
EMGT 6225	Economic Decision Making
EMGT 6305	Financial Management for Engineers
ENTR 6219	Financing Ventures from Early Stage to Exit
<b>Information and Business Analysis</b>	
IE 7300 or BIOE 5860 or BIOE 5880 or CS 6140 or CS 6220 or DA 5030 or EECE 5644	Statistical Learning for Engineering Engineering Approaches to Precision Medicine I Computational Methods in Systems Bioengineering Machine Learning Data Mining Techniques Introduction to Data Mining/Machine Learning Introduction to Machine Learning and Pattern Recognition
DAMG 6210 or IE 6700	Data Management and Database Design Data Management for Analytics
DAMG 7290	Data Warehousing and Business Intelligence
DS 5110	Introduction to Data Management and Processing
IE 5640 or IE 7275 or CS 6220	Data Mining for Engineering Applications Data Mining in Engineering Data Mining Techniques
IE 6600 or EECE 5642	Computation and Visualization for Analytics Data Visualization
INFO 6215	Business Analysis and Information Engineering

### Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

### Engineering Economic Decision Making, Graduate Certificate

The Graduate Certificate in Engineering Economic Decision Making focuses on developing economic decision-making skills in the context of engineering operations and projects with attention to decision-making models, causes of risk and uncertainty, decisions under uncertainty, and ways to change and influence the degree of risk and uncertainty.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and to make data-driven, financial-based, and economic-based decisions.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Engineering Management, Graduate Certificate

The Graduate Certificate in Engineering Management focuses on bridging the gaps between the fields of engineering, technology, and business with a focus on the art and the science of planning, organizing, allocating, directing, and controlling the activities and resources of organizations engaged in engineering activities and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills in a management setting to build decision-making models and make data-driven and/or economic-based decisions.

Note: Students enrolled in the master's in engineering management program are not eligible for this graduate certificate.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
EMGT 5220	Engineering Project Management	4
EMGT 6225	Economic Decision Making	4
IE 6200	Engineering Probability and Statistics	4

### Elective

Code	Title	Hours
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.		
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6305	Financial Management for Engineers	
OR 6205	Deterministic Operations Research	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Lean Six Sigma, Graduate Certificate

The Graduate Certificate in Lean Six Sigma focuses on enhancing engineering knowledge and skills with the fundamentals of lean manufacturing thinking and six sigma concepts to improve business processes through optimizing flow, eliminating waste, and emphasizing quality.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of lean six sigma concepts across an enterprise to contribute to an organization's continuous improvement initiatives by identifying and employing lean and quality tools and techniques, along with utilizing statistical methods to achieve quality control.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 6200	Engineering Probability and Statistics	4
IE 7280	Statistical Methods in Engineering	4
IE 7285	Statistical Quality Control	4

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Renewable Energy, Graduate Certificate

The Graduate Certificate in Renewable Energy focuses on the combination of analysis and integration of energy systems engineering technology with key renewable engineering technology, including solar and wind generation, with environmental protection and manufacturing considerations.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems with a specific focus on renewable energy technologies along with EPA regulatory structure, including the LEED certification program, as well as industrial ecology, including life-cycle analysis and technical cost modeling.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
ENSY 5000	Fundamentals of Energy System Integration	4
ENSY 5585	Wind Energy Systems	4
ME 5685	Solar Thermal Engineering	4

## Elective

Code	Title	Hours
Complete one of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.		
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Sustainable Energy Systems, Graduate Certificate

The Graduate Certificate in Sustainable Energy Systems focuses on the integration of energy systems engineering technology with sustainable building systems, including the design and operation of buildings with minimal energy and environmental impact.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to analyze energy systems as they relate to sustainable engineering building design with a focus on renewable energy with LEED certification or with a focus on industrial ecology, including life-cycle analysis and technical cost modeling.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
SBSY 5200	Sustainable Engineering Systems for Buildings	4
ENSY 5000	Fundamentals of Energy System Integration	4

## Electives

Code	Title	Hours
Complete two of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor.		
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5585	Wind Energy Systems	
ME 5685	Solar Thermal Engineering	

## Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

## Software Engineering Systems, Graduate Certificate

The Graduate Certificate in Software Engineering Systems focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate is designed to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

*Note:* Master of Science in Software Engineering Systems students are not eligible for this graduate certificate.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

### Electives

Code	Title	Hours
Complete two of the following:		
CSYE 6225	Network Structures and Cloud Computing	4
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	4
CSYE 7280	User Experience Design and Testing	4

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Supply Chain Engineering Management, Graduate Certificate

The Graduate Certificate in Supply Chain focuses on acquiring and applying the knowledge and skills associated with designing, analyzing, managing, and improving supply chains within technology companies with attention on optimizing parts of a supply chain for effective and efficient functioning.

This four-course graduate certificate seeks to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to supply chains using deterministic and probabilistic decision-making models, lean concepts, mass customization principles, and methods of manufacturing including logistics, warehousing, and scheduling.

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
IE 5617	Lean Concepts and Applications	4
IE 7200	Supply Chain Engineering	4

## Electives

Code	Title	Hours
Complete two of the following, provided any prerequisites have been satisfied. Electives outside this list may be taken with prior approval from the faculty advisor:		
EMGT 5300	Engineering/Organizational Psychology	
IE 6200	Engineering Probability and Statistics	
IE 6300	Manufacturing Methods and Processes	
OR 7310	Logistics, Warehousing, and Scheduling	

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Technology Systems Management, Graduate Certificate

The Graduate Certificate in Technology Systems Management focuses on bridging the fields of technology, engineering, and business with a focus on the art and the science of managing organizational activities, including project and human resources engaged in engineering and technology development.

This four-course graduate certificate seeks to provide students with opportunities to apply technological knowledge and skills in a management setting to make data-driven, financial-based, and economic-based decisions.

Note: This certificate is for graduate engineering students as well as non-engineers and non-graduate engineering students.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
EMGT 5220	Engineering Project Management	4
EMGT 5300	Engineering/Organizational Psychology	4
EMGT 6225	Economic Decision Making	4
EMGT 6305	Financial Management for Engineers	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Multidisciplinary Programs

Website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/>)

Dana Research Center, 5th Floor

The multidisciplinary graduate engineering Master of Science programs integrate engineering solutions from the fields of technology and business by developing technical and engineering skills through advanced coursework and complex technical projects. Each program focuses on the application of knowledge and skills to business and industrial settings. The software, data, and network systems programs blend academic and corporate

experience to enable students to enhance their professional capabilities, thereby facilitating career transformation. Given an applied focus, each program provides learning opportunities to develop the skills needed to create innovative, practical, and effective solutions that can be easily applied to current professional challenges.

The multidisciplinary graduate engineering programs are designed to prepare students for direct entry into the workforce. Students who are seeking preparation for entry into PhD programs should consider specific department MS programs (p. 402) aligned with their research interests.

## **Graduate Certificate Options**

Students enrolled in a graduate degree program in the College of Engineering have the opportunity to pursue an engineering graduate certificate in addition to or in combination with the MS degree. For more information please refer to Graduate Certificate Programs (p. 625).

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP OPTION**

Students have the opportunity to pursue the Gordon Engineering Leadership Program (p. 1127) in combination with the MS degree.

## **Programs**

### **Master of Science in Information Systems (MSIS)**

- Information Systems (p. 598)
- Information Systems—Bridge (p. 600)
- Information Systems—Bridge—Online (p. 601)
- Information Systems—Online (p. 601)

### **Master of Science (MS)**

- Cyber-Physical Systems (p. 602)
- Data Architecture and Management (p. 604)
- Software Engineering Systems (p. 605)
- Telecommunication Networks (p. 607)

## **Graduate Certificates**

- Blockchain and Smart Contract Engineering (p. 608)
- Broadband Wireless Systems (p. 608)
- Engineering Leadership (p. 609)
- IP Telephony Systems (p. 611)
- Software Engineering Systems (p. 596)

### **Information Systems, MSIS**

We offer cutting-edge expertise in a variety of courses that combine technological advances and business practices. We stress creative and inventive approaches to problem solving, which necessitates empowering students so that they can take charge of their own software projects to become originally productive. Our information systems program (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy/>) is as much an art as a science. It bypasses mechanical learning and highlights the value and excitement of engineering thinking that gets things done efficiently as well as imaginatively. We balance theory and practice, on the premise that they are always intertwined and interdependent.

We seek to provide a basic foundation for our students and then seek to push them to new heights to advance their information technology skills in a way that keeps up and, better yet, exceeds the necessarily fast pace of this progressive field. It is not for us just a question of not being left behind; we strive to be at the forefront of software innovation in an effort to transform contemporary society even more radically than technology has already done—to take gigantic strides in business, medicine, education, and security.

The program offers a wide range of courses that reflect current and future industry trends:

- Cryptocurrency and Smart Contract Engineering
- Engineering of Big-Data Systems
- Business Intelligence and Data Analytics
- Cyber-Security Engineering and Development
- Digital Business
- Full-Stack Software Engineering
- User Experience Design

- Data Science and Machine Learning Systems Engineering

## Gordon Institute of Engineering Leadership

### MASTER'S DEGREE IN INFORMATION SYSTEMS WITH GRADUATE CERTIFICATE IN ENGINEERING LEADERSHIP

Students may complete a master's degree in Information Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved information systems technical courses.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the electives course list below.		12

#### PROJECT OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
Complete 8 semester hours from the electives course list below.		8

#### THESIS OPTION

Code	Title	Hours
INFO 7945	Master's Project	4
INFO 7990	Thesis	4
Complete 4 semester hours from the electives course list below.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

### General Information Systems Concentration

Code	Title	Hours
Complete 16 semester hours from the following subject code:		16
INFO		

### Electives

Code	Title	Hours
CSYE (except CSYE 6220)		
DAMG		
INFO		
TELE		

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Information Systems, MSIS—Bridge

The Master of Science in Information Systems—Bridge (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-insy-bridge/>) (MSIS-Bridge) addresses the needs of the digital revolution by preparing students with non-STEM, nontechnical bachelor's degrees to become information systems professionals. MSIS-Bridge students are the link between business users and technologists. As industries launch into a digitized future, professionals with a clear understanding of how technology can be used to address significant societal challenges are in demand. The MSIS-Bridge program closes the gaps between business management, software engineering, and information technology to help students solve complex real-world issues in business and society. It also upskills and reskills to help individuals or businesses identify organizational skills gaps and create a tactical training plan to fill them with new skills and knowledge. Through specially created and selected core courses, students gain the engineering foundation needed to excel in the classroom and in the IT sector.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

### Restricted Electives

Code	Title	Hours
Complete 12 semester hours from the following:		
DAMG 6210	Data Management and Database Design	
INFO 6150	Web Design and User Experience Engineering	
INFO 6205	Program Structure and Algorithms	
INFO 6215	Business Analysis and Information Engineering	
INFO 6245	Planning and Managing Information Systems Development	
INFO 6255	Software Quality Control and Management	
INFO 6350	Smartphones-Based Web Development	
INFO 7245	Agile Software Development	
INFO 7385	Managerial Communications for Engineers	

### Electives

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		
CSYE (except CSYE 6220)		16
DAMG		
INFO		
TELE		

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Information Systems, MSIS—Bridge—Online

The Online Master of Science in Information Systems—Bridge from the College of Engineering at Northeastern University is designed to teach students to use technology to address the challenges facing people in businesses, organizations, and communities across the world. This prestigious and meticulously designed master's program allows capable graduates from all academic and professional backgrounds to reposition themselves across a range of rapidly growing IT industries, ready to help define and lead the systemic changes that are reshaping our societies.

Designed for graduates and working professionals from any background, the online MSIS offers you an opportunity to obtain the technical skills and business management expertise to drive digital transformation in any organization. You'll study deep applied knowledge across a range of technological fields, including UX design, software development, data analytics, and digital business processes.

Along the way, you'll have an opportunity to learn business leadership best practices. With a strong working knowledge of quality assurance, data management, agile methodologies, and marketing assessment, you'll be ready for leadership in almost any organization or industry.

With this unique and flexible set of must-have skills, you'll be ideally positioned to step into a diverse range of tech leadership roles including IT project manager, systems administrator, software developer, information security analyst, and more.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Introductory Coursework

*Note:* To ensure that students have the foundation necessary to be successful in this program, each student must complete the following with a minimum grade of B:

Code	Title	Hours
INFO 5001	Application Modeling and Design	4
INFO 5002	Introduction to Python for Information Systems	4

### Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

### Additional Requirements

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
DAMG 6210	Data Management and Database Design	4
INFO 6105	Data Science Engineering Methods and Tools	4
INFO 6150	Web Design and User Experience Engineering	4
INFO 6245	Planning and Managing Information Systems Development	4
INFO 6350	Smartphones-Based Web Development	4
INFO 7245	Agile Software Development	4

### Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Information Systems—Online, MSIS

The Online Master of Science in Information Systems from the College of Engineering at Northeastern University is designed to teach students to use technology to address the challenges facing people in businesses, organizations, and communities across the world.

The online MSIS offers you an opportunity to obtain the technical skills and business management expertise to drive digital transformation in any organization. You'll study deep applied knowledge across a range of technological fields, including UX design, software development, data analytics, and digital business processes.

Along the way, you'll have an opportunity to learn business leadership best practices. With a strong working knowledge of quality assurance, data management, agile methodologies, and marketing assessment, you'll be ready for leadership in almost any organization or industry.

With this unique and flexible set of must-have skills, you'll be ideally positioned to step into a diverse range of tech leadership roles including IT project manager, systems administrator, software developer, information security analyst, and more.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
INFO 5100 and INFO 5101	Application Engineering and Development and Lab for INFO 5100	4

### Additional Requirements

Code	Title	Hours
CSYE 7280	User Experience Design and Testing	4
DAMG 6210	Data Management and Database Design	4
INFO 6105	Data Science Engineering Methods and Tools	4
INFO 6150	Web Design and User Experience Engineering	4
INFO 6245	Planning and Managing Information Systems Development	4
INFO 6350	Smartphones-Based Web Development	4
INFO 7245	Agile Software Development	4

### Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Cyber-Physical Systems, MS

The Master of Science in Cyber-Physical Systems (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen-ms-cyps/>) with a concentration in the Internet of Things is designed to prepare our graduates for a world of connected devices. This innovative multidisciplinary program is designed to meet the demand for a new kind of specialist—one who can engineer and develop new interactive services; acquire, fuse, and process the data collected from sensors, actuators, controllers, and other devices; and develop architectures to interconnect these elements as part of larger, more diverse systems. It is expected that careers in this rapidly evolving area will encompass industry sectors ranging from energy, healthcare, transportation, and infrastructure to manufacturing.

This program integrates the study of wireless networking, protocols, sensor networks, security, software development, embedded systems, data analytics, and Big Data to provide students with the knowledge and tools to develop IoT applications, to analyze and design IoT architectures for different application domains, and to develop data analytic tools to analyze the large amounts of data generated by the massive deployment of IoT devices.

### Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any one of the three options: coursework option, project option, and thesis option. Specific degree requirements for each of these options can be found under the Program Requirements tab. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester.

Master's Project and Thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a Master's Project or a Thesis need to be submitted at least one month before the start of the semester.

## Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
TELE 6510	Fundamentals of the Internet of Things	4
TELE 6530	Connected Devices	4
Complete two of the following:		8
CSYE 6200	Concepts of Object-Oriented Design	
TELE 6500	Machine Learning for IoT Systems	
TELE 6550	IoT Embedded System Design	

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the electives course list below.		16

#### PROJECT OPTION

Code	Title	Hours
TELE 7945	Master's Project	4
Complete 12 semester hours from the electives course list below.		12

#### THESIS OPTION

Code	Title	Hours
TELE 7945	Master's Project	4
TELE 7990	Thesis	4
Complete 8 semester hours from the electives course list below.		8
In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.		

### Electives

Code	Title	Hours
Complete graduate-level coursework from any of the following subject codes:		
CSYE		
DAMG		
INFO		
TELE		

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Data Architecture and Management, MS

For program contact information, please visit this website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-daam/>).

Many MS programs in the data area deal with data collection and analysis but do not, however, address a crucial activity that data scientists, data analysts, business analysts, and many software engineers need to perform to make that data valuable—data integration. That activity may also be referred to as data preparation, data curation, application integration, and data engineering based on the integration of use cases and integration persona. The Master of Science in Data Architecture and Management focuses on these activities.

Data systems engineering occurs because data is fragmented and usually scattered across many data sources. However, even if all the data one needed were in one place, there is still an intensive need for integration. Information is data in context and the context of data as collected is different than the many ways it needs to be transformed so as to generate useful information.

The data engineering field could be thought of as a superset of business intelligence and data warehousing that brings in more elements from software engineering. This discipline also integrates specialization around the operation of so-called Big Data distributed systems, along with concepts around the extended Hadoop ecosystem, stream processing, and in computation at scale.

The Master of Science in Data Architecture and Management offers a multitude of courses in data engineering in addition to supplementary courses that are required to deliver the data results in a meaningful way to management. We plan to cover data management, advanced data management, data warehousing and business intelligence, column databases, data science engineering, and Big Data engineering. On the software engineering side, we offer advanced Big Data programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by hundredfold increases in speed. Due to the high-level mathematical operations required to make these programs run, only software engineers can make the necessary mathematical algorithms execute quickly enough to work in these complicated areas and get the finest results.

### Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
DAMG 6105	Data Science Engineering with Python	4
DAMG 6210	Data Management and Database Design	4
DAMG 7250	Big Data Architecture and Governance	4
DAMG 7370	Designing Advanced Data Architectures for Business Intelligence	4

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 16 semester hours from the electives course list below.		

**PROJECT OPTION**

Code	Title	Hours
DAMG 7945	Master's Project	4
Complete 12 semester hours from the electives course list below.		12

**THESIS OPTION**

Code	Title	Hours
DAMG 7945	Master's Project	4
DAMG 7990	Thesis	4
Complete 8 semester hours from the electives course list below.		8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

**Electives**

Code	Title	Hours
Complete 16 semester hours from the following subject codes:		16
CSYE		
DAMG		
INFO		
TELE		

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Software Engineering Systems, MS**

Website (<http://www.coe.neu.edu/degrees/ms-cse/>)

The software engineering systems program takes a sociotechnical, engineering approach to software. This engineering foundation is designed to enable students to embrace real-world complexity as a golden opportunity, especially for the more technically advanced student. We are committed to shaping our students to be intuitive problem solvers, experienced engineering architects, and result leaders who will have a great impact at the exciting three-way intersection of computer science, engineering, and ethics.

Our program offers a multitude of courses in Big Data engineering and analytics in addition to supplementary courses that are required to deliver the data analytics results in a meaningful way to management. We cover data management, advanced data management, business intelligence, column databases, data science, and Big Data engineering. We offer advanced functional programming using the powerful Scala language and a course on advanced data science as well as cloud computing. Multithread concurrent computing is also offered as it is important for synchronizing a huge set of servers working in parallel to do large-scale analytics to make things run faster by a hundredfold increase in speed. Due to the high-level mathematical operations required to run these programs, only software engineers have the capacity to work in such complicated areas. Only they can make the necessary mathematical algorithms execute quickly enough to get the finest results.

Our engineers become fluent in data science for the sake of building the actual system. They study how to write machine-learning algorithms on top of statistical packages.

- Students study the fundamentals of logical computing formulation and program construction as well as the mathematical modeling and analysis of algorithms—an essential aspect of data science analytics.
- Students study clustering techniques, along with topic modeling and classification and logical regression techniques, as well as Bayesian statistics.
- Students study how to configure and operate a Hadoop environment (large clusters of commodity hardware) and in the process how to integrate data from diverse sources to move and manage data through Big Data platforms (in-house or in the cloud). Data ingestion, the filtering and firing of millions of operations to run over large clusters of commodity hardware, is a software engineering technique that we teach our students how to perform through Scala, multithreading, Spark programming, and “map-reduce” techniques.
- We show students how to make the business case for analytics projects and how to follow an execution road map that involves understanding the architectures underpinning such gigantic platforms as well as the resourcing and cost issues.

**Degree Requirements**

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

## Graduate Certificate Options

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### Master's Degree in Software Engineering Systems with Graduate Certificate in Engineering Leadership

Students may complete a Master of Science in Software Engineering Systems in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate will require 16 hours of advisor-approved software design engineering technical courses.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
	Complete 24 semester hours from the electives course list below.	24

#### PROJECT OPTION

Code	Title	Hours
CSYE 7945	Master's Project	4
	Complete 20 semester hours from the electives course list below.	20

#### THESIS OPTION

Code	Title	Hours
CSYE 7945	Master's Project	4
CSYE 7990	Thesis	4
	Complete 16 semester hours from the electives course list below.	16

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

### Electives

Code	Title	Hours
	Complete a minimum of 12 semester hours from the CSYE subject code:	12
CSYE		
	Complete 12 semester hours from any of the following subject codes:	12
CSYE		
DAMG		
INFO (INFO 6250 excluded)		
TELE		

## PROGRAM CREDIT/GPA REQUIREMENTS

32 total semester hours required

Minimum 3.000 GPA required

### Telecommunication Networks, MS

For program contact information, please visit this website (<https://coe.northeastern.edu/academics-experiential-learning/academic-departments/mgen/ms-tnet/>).

The Master of Science in Telecommunication Networks is designed for professionals currently in the telecommunications or networking field who either wish to enhance their technical skills and credentials or who wish to make a transition to the business side of telecommunications or networking. We also welcome applications from prospective students with limited industry experience. This program, which may be pursued on a full- or part-time basis, is one of only a very few master's programs in telecommunications and networking in the United States that is truly multidisciplinary, giving students the flexibility to tailor the curriculum to their specific interests, backgrounds, and career goals.

### Degree Requirements

Students in the program must complete 32 semester hours of approved coursework with a minimum grade-point average of 3.000. Students can complete a master's degree by pursuing any of one of the three options: coursework, project, or thesis. Although there are some dependencies among the core courses, the program may be started in either the fall or spring semester. The three core courses each carry 4 semester hours of credit.

Master's project and thesis options must be carried out under the supervision of a professor and must have prior approval of the program director. Proposals for a master's project or a thesis need to be submitted at least one month before the start of the semester.

### Graduate Certificate Options

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

### GORDON INSTITUTE OF ENGINEERING LEADERSHIP

#### *Master's Degree in Telecommunication Networks with Graduate Certificate in Engineering Leadership*

Students may complete a Master of Science in Telecommunications Networks in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 32-semester-hour degree and certificate require 12 hours of technical core courses from the telecommunication networks program and 4 hours from the technical course list provided for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 20 semester hours from the electives course list below.		

**PROJECT OPTION**

Code	Title	Hours
TELE 7945	Master's Project	4
Complete 16 semester hours from the electives course list below.		16

**THESIS OPTION**

Code	Title	Hours
TELE 7945	Master's Project	4
TELE 7990	Thesis	4

Complete 12 semester hours from the electives course list below.

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

**Electives**

Code	Title	Hours
Complete 20 semester hours from the following subject codes:		20
CSYE		
DAMG		
INFO		
TELE		

**PROGRAM CREDIT/GPA REQUIREMENTS**

Minimum of 32 total semester hours required

Minimum 3.000 GPA required

**Blockchain and Smart Contract Engineering, Graduate Certificate**

The Graduate Certificate in Blockchain and Smart Contract Engineering addresses the rapidly growing and revolutionary field of distributed ledger (blockchain) technology. Companies from different industries are preparing to enhance their business practices through cryptocurrency, decentralized computing, digital security, smart contracts, and more. The certificate program covers blockchain platforms such as Ethereum that bring about transparency and trust to all participants in complex multiparty relationships. The implication is tremendous—from new currency and incentive systems to faster, less expensive, and more efficient transactions of all kinds, from banking to healthcare. Students have an opportunity to learn how blockchain platforms and their underlying trust models will impact the future of legally binding multiparty contracts. In addition, students also have an opportunity to learn how crypto-engineering techniques can be used to create digital trust fabrics that could safely facilitate the movement of any kind of transactions.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Required Courses</b>		
INFO 7500	Cryptocurrency and Smart Contract Engineering	4
INFO 7510	Smart Contract Application Engineering and Development	4
INFO 7520	Engineering of Advanced Cryptocurrency Systems	4
INFO 7525	Regulatory Aspects of Smart Contract Automation	2
INFO 7535	Digital Smart Contracts Product Innovations	2

**Program Credit/GPA Requirements**

16 total semester hours required

Minimum 3.000 GPA required

**Broadband Wireless Systems, Graduate Certificate**

The broadband wireless systems graduate certificate program focuses on the fundamentals of wireless communications, IP networks and protocols, and telecommunications infrastructure as preparation for developing expertise in ongoing developments in mobile networking, broadband wireless communications, and mobile apps.

The four-course graduate certificate requires that two TNET core technical courses be taken along with two other specified courses. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Mobile Wireless Communications and Networking (TELE 6100) may not be waived under any circumstances.

*Note:* Master of Science in Telecommunication Networks students are eligible for this graduate certificate.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4
TELE 6100	Mobile Wireless Communications and Networking	4

### Program Credit/GPA Requirements

16 total semester hours required  
Minimum 3.000 GPA required

### Engineering Leadership, Graduate Certificate

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Engineering Leadership Program directed by the Gordon Institute of Engineering Leadership offers a graduate certificate that pairs with over 25 master's degrees in the College of Engineering, College of Science, and Khoury College of Computer Sciences. The Gordon Program is a transformational graduate program designed to build a future corps of engineering leadership professionals.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

### How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional information can be found on the Gordon Engineering Leadership Program website. (<https://gordon.northeastern.edu>)

### Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both a Master of Science degree and a Graduate Certificate in Engineering Leadership.

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Students can enroll in the Engineering Leadership Graduate Certificate while pursuing the following degrees:

- MS Advanced and Intelligent Manufacturing (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/advanced-and-intelligent-manufacturing/>)
- MS Biotechnology (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-science/ms-in-biotechnology/>)
- MS Climate Science and Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/climate-science/>)
- MS Computer Science (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/computer-science/>)
- MS Cybersecurity (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/ms-in-information-assurance-and-cyber-security/>)
- MS Data Analytics Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-data-analytics-engineering/>)
- MS Engineering and Public Policy (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-and-public-policy/>)
- MS Human Factors (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/human-factors/>)
- MS Robotics (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/robotics/>)
- MS Telecommunication Networks (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-telecommunication-networks/>)
- MSBioE Bioengineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-bioengineering/>)
- MSChE Chemical Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/chemical-engineering/>)
- MSCivE Civil Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-civil-engineering/>)
- MSCSE Software Engineering Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-computer-systems-engineering/>)
- MSECE Electrical and Computer Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering/>)
- MSECEL Electrical and Computer Engineering Leadership (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering-leadership/>)
- MSEM Engineering Management (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-management/>)
- MSEN Energy Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-energy-systems/>)
- MSEnvE Environmental Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-environmental-engineering/>)
- MSIE Industrial Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-industrial-engineering/>)
- MSIS Information Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-information-systems/>)
- MSME Mechanical Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-mechanical-engineering/>)
- MSOR Operations Research (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-operations-research/>)
- MSSBS Sustainable Building Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-sustainable-building-systems/>)

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
Complete the following two courses based on the discipline of your master's program:		
ENLR 7440	Engineering Leadership Challenge Project 1	4

or EECE 7440	Electrical and Computer Engineering Leadership Challenge Project 1	
or ENSY 7440	Energy Systems Engineering Leadership Challenge Project 1	
or IE 7440	Industrial Engineering Leadership Challenge Project 1	
or ME 7440	Mechanical Engineering Leadership Challenge Project 1	
or TELR 7440	Technology Leadership Challenge Project 1	
ENLR 7442	Engineering Leadership Challenge Project 2	4
or EECE 7442	Electrical and Computer Engineering Leadership Challenge Project 2	
or ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2	
or IE 7442	Industrial Engineering Leadership Challenge Project 2	
or ME 7442	Mechanical Engineering Leadership Challenge Project 2	
or TELR 7442	Technology Leadership Challenge Project 2	

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### IP Telephony Systems, Graduate Certificate

The Graduate Certificate in IP Telephony Systems focuses on the fundamental knowledge in communications, IP networks and protocols, media transport, and signaling as preparation to developing expertise into ongoing developments in VoIP networks and services, the IP Multimedia Subsystem (IMS), unified communications, and video networks.

The four-course graduate certificate requires that three TNET core technical courses be taken along with a specified fourth course. With the approval of the certificate director, one of the core courses may be waived with another technical course taken in its place. Unified Communications and Collaboration (TELE 6350) may not be waived under any circumstance.

*Note:* Master of Science in Telecommunication Systems Management/Telecommunication Networks students are not eligible for this graduate certificate.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
TELE 5330 and TELE 5331	Data Networking and Lab for TELE 5330	4
TELE 5350	Telecom and Network Infrastructure	4
TELE 5360	Internet Protocols and Architecture	4
TELE 6350	Unified Communications and Collaboration	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Software Engineering Systems, Graduate Certificate

The Graduate Certificate in Software Engineering Systems focuses on the sociotechnical approach to software engineering with attention on using engineering tools and considering real-world complexities to design and construct practical and viable software solutions.

This four-course graduate certificate is designed to provide students with opportunities to apply the fundamentals of engineering knowledge and skills to software development with attention on enterprise design and integration, secure systems design and creation, and data integration and architecture.

*Note:* Master of Science in Software Engineering Systems students are not eligible for this graduate certificate.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
CSYE 6200	Concepts of Object-Oriented Design	4
INFO 6205	Program Structure and Algorithms	4

### Electives

Code	Title	Hours
Complete two of the following:		
CSYE 6225	Network Structures and Cloud Computing	
CSYE 7215	Foundations of Parallel, Concurrent, and Multithreaded Programming	
CSYE 7280	User Experience Design and Testing	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Interdisciplinary Graduate Programs

### Doctor of Philosophy (PhD)

- Cybersecurity (p. 374)
- Interdisciplinary Engineering (p. 418)

### Master of Science (MS)

- Applied Physics and Engineering (p. 480)
- Climate Science and Engineering (p. 446)
- Product Development (p. 623)

## Cybersecurity, PhD

A research-based, interdisciplinary Doctor of Philosophy (PhD) in Cybersecurity combines a strong security technical foundation with a security policy and social sciences perspective. It seeks to prepare graduates to advance the state of the art of security in systems, networks, and the internet in industry, academia, and government. The interdisciplinary nature of the program distinguishes it from traditional doctoral degree programs in computer science, engineering, or social sciences and makes it unique in the Boston area.

Students who choose the PhD in Cybersecurity program have a strong desire to pursue academic research solving critical cybersecurity challenges facing today's society. The PhD program is a natural path for students in the college's Master of Science in Cybersecurity (<http://www.ccs.neu.edu/graduate/degree-programs/m-s-in-information-assurance/>) program who want to pursue research and students with bachelor's degrees and an interest in research-focused careers. Students who pursue careers in advancing the state of the art of cybersecurity have an opportunity to gain:

- A strong technical foundation in cybersecurity and an interdisciplinary perspective based on policy and social science
- A path to a research-focused career coupled with depth in information assurance research at a leading institution, one of the earliest designees by NSA/DHS as a National Center of Academic Excellence in Information Assurance Research, Information Assurance/Cyber Defense, and Cyber Operations
- The opportunity to work with and learn from faculty who are recognized internationally for their expertise and contributions in information assurance from Northeastern University's Khoury College of Computer Sciences, the Department of Electrical and Computer Engineering, and the College of Social Sciences and Humanities
- Access to research projects at Northeastern's research centers focused on security:
  - The Cybersecurity and Privacy Institute (<https://cyber.ccis.northeastern.edu/about/>): The mission of Northeastern's Cybersecurity and Privacy Institute is to safeguard critical technology. Forging partnerships with experts in industry, government, and academia worldwide, the Institute's faculty and students develop, protect, and enhance technologies on which the world relies—from mobile devices and "smart" IoT applications to tomorrow's self-driving cars and delivery drones. Their expertise spans algorithm auditing; cloud security; cryptography; differential privacy; embedded device security; internet-scale security measurements; machine learning; big data; security, malware, and advanced threats; network protocols and security; web and mobile security; and wireless network security.
  - The International Secure Systems Lab (<http://www.iseclab.org/>), affiliated with Northeastern, a collaborative effort of European and U.S. researchers focused on web security, malware, and vulnerability analysis; intrusion detection; and other computer security issues.
  - The ALERT Center (<http://www.northeastern.edu/alert/>), where Northeastern is the lead institution, a multiuniversity Department of Homeland Security Center of Excellence involved in research, education, and technology related to threats from explosives.

The benefits of the Boston area:

- World-renowned for academic and research excellence, the Boston area is also home to some of the nation's largest Department of Defense contractors and government and independent labs such as MIT Lincoln Lab, MITRE, and Draper Lab.

## Degree Requirements

The PhD in Cybersecurity degree requires completion of at least 48 semester semester hours beyond a bachelor's degree. Students who enter with an undergraduate degree will typically need four to five years to complete the program, and they will be awarded a master's degree en route to the PhD.

## Doctoral Degree Candidacy

A student is considered a PhD degree candidate after completing the core courses with at least a 3.500 GPA, with no grades lower than a B in the core courses, and either publishing a paper in a strong conference or journal or passing an oral exam that is conducted by a committee of three cybersecurity faculty members and based on paper(s) written by the student.

### RESIDENCY

One year of continuous full-time study is required after admission to the PhD candidacy. During this period, the student will be expected to make substantial progress in preparing for the comprehensive examination.

### TEACHING REQUIREMENT

All cybersecurity PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment or quiz or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

### DISSERTATION ADVISING

The doctoral dissertation advising team for each student consists of two cybersecurity faculty members, one in a technical area. When appropriate, the second faculty advisor will be from the policy/social science area.

### DISSERTATION COMMITTEE

With the help of the advisor, a student selects the committee, consisting of at least four members, to be approved by the PhD cybersecurity curriculum committee. The four members must include the advisor, two internal members, and an external member.

### COMPREHENSIVE EXAMINATION

A PhD student must submit a written dissertation proposal and present it to the dissertation committee. The proposal should identify the research problem, the research plan, and the potential impact of the research on the field. The presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee after the public presentation.

**DISSERTATION DEFENSE**

A PhD student must complete and defend a dissertation that involves original research in cybersecurity.

**AWARDING OF MASTER'S DEGREES**

Students who enter the PhD in Cybersecurity program with a bachelor's degree have the option of earning a master's degree from one of the departments participating in the program. To do so, they must meet all of the department's degree requirements.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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**Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Teaching  
Qualifying exam and area exam  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

**Core Requirements**

A grade of B or higher is required in each core course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
<b>Foundations</b>		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
CY 5770 or EECE 5641	Software Vulnerabilities and Security Introduction to Software Security	4
CY 6740 or EECE 5699	Network Security Computer Hardware and System Security	4

**Electives and Tracks**

Code	Title	Hours
Note: Consult faculty advisor for other acceptable courses.		
<b>Tracks</b>		
Select at least two courses from one track:		
<i>Hardware Security</i>		
CS 6410	Compilers	
CS 6710	Wireless Network	
EECE 5666	Digital Signal Processing	
EECE 7352	Computer Architecture	
EECE 7364	Mobile and Wireless Networking	
EECE 7390	Computer Hardware Security	
<i>Machine Learning</i>		
CS 5700	Fundamentals of Computer Networking	
CS 6140	Machine Learning	
CS 7150	Deep Learning	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7397	Advanced Machine Learning	
<i>Network Security</i>		
CS 6710	Wireless Network	

CY 6740	Network Security
CS 7610	Foundations of Distributed Systems
CS 7775	Seminar in Computer Security
CY 5130	Computer System Security
EECE 5155	Wireless Sensor Networks and the Internet of Things
EECE 5576	Wireless Communication Systems
EECE 7336	Digital Communications
EECE 7364	Mobile and Wireless Networking
EECE 7374	Fundamentals of Computer Networks
<i>Systems Security</i>	
CS 6410	Compilers
CS 7600	Intensive Computer Systems
CS 7610	Foundations of Distributed Systems
CY 5130	Computer System Security
CY 6740	Network Security
CY 6760	Wireless and Mobile Systems Security
EECE 7352	Computer Architecture
<i>Theory</i>	
CS 7800	Advanced Algorithms
CS 7805	Complexity Theory
CS 7810	Foundations of Cryptography
CS 7870	Seminar in Theoretical Computer Science
EECE 7337	Information Theory
<i>Usable Security and Privacy</i>	
CS 6350	Empirical Research Methods
CS 6760	Privacy, Security, and Usability
CS 7340	Theory and Methods in Human Computer Interaction
INSH 6300	Research Methods in the Social Sciences
INSH 6302	Qualitative Methods
INSH 6500	Statistical Analysis
INSH 7400	Quantitative Analysis
<i>Cybersecurity Policy</i>	
CRIM 6200	Criminology
CRIM 6262	Evidence-Based Crime Policy
CY 5200	Security Risk Management and Assessment
CY 5210	Information System Forensics
CY 5250	Decision Making for Critical Infrastructure
POLS 7341	Security and Resilience Policy
<i>Electives</i>	
Selected in consultation with advisor from graduate-level CS and ECE courses and graduate-level courses offered by the College of Social Sciences and Humanities, including CRIM, CS, CY, DS, EECE, INSH, MATH and POLS.	
28	

## Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Degree Requirements

Incoming PhD in Cybersecurity students who have already completed a Master of Science in an adjacent field may petition to the graduate program administration for advanced entry. Advanced entry petitions are reviewed by the program administration on a case-by-case basis. Please note that advanced entry does not waive by itself any part of the PhD coursework requirements. As a degree conferral requirement, a minimum of 16 semester hours of coursework beyond the 32 semester hours of the master's degree is required of advanced entry PhD students (48 semester hours is required of standard entry PhD students). A grade of B or higher is required in each course. A cumulative 3.500 GPA is required for the core requirement.

### Doctoral Degree Candidacy

Refer to the PhD Cybersecurity overview (p. 374) for admission to candidacy requirements.

### Residency

Refer to the PhD Cybersecurity overview (p. 374) for residency requirements.

### Teaching Requirement

Refer to the PhD Cybersecurity overview (p. 374) for teaching requirements.

### Dissertation Advising

Refer to the PhD Cybersecurity overview (p. 374) for dissertation advising requirements.

### Dissertation Committee

Refer to the PhD Cybersecurity overview (p. 374) for dissertation committee requirements.

### Comprehensive Examination

Refer to the PhD Cybersecurity overview (p. 374) for comprehensive examination requirements.

### Dissertation Defense

Refer to the PhD Cybersecurity overview (p. 374) for dissertation defense and completion requirements.

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Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Teaching  
Qualifying exam and area exam  
Annual review  
Dissertation proposal  
Dissertation committee  
Dissertation defense

### Core Requirement

Students must maintain a minimum GPA of 3.500 as well as earn a grade of B or better in each core course.

Code	Title	Hours
Consult your faculty advisor for approved courses.		16

### Dissertation

Code	Title	Hours
CY 9990	Dissertation Term 1	
CY 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
CY 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

Minimum 16 semester hours required  
Minimum 3.000 GPA required

### Interdisciplinary Engineering, PhD

130 Snell Engineering Center  
617.373.2711

The College of Engineering offers an interdisciplinary engineering Doctor of Philosophy degree involving substantial work in two or more academic departments or disciplines. This is an individually designed program for the student who wishes to pursue graduate studies in an area that substantially overlaps two or more units. In such cases, that student may design, in consultation with their faculty advisor(s), an interdisciplinary program. The program will correspond in scope and depth to Northeastern University's established degree standards but need not agree exactly with the regulations of individual units. Individually designed interdisciplinary degree programs must be approved by the appropriate graduate office(s).

The interdisciplinary engineering program admits applicants into the PhD program either directly after earning a suitable bachelor's degree (i.e., direct entry) or after earning a suitable master's degree (i.e., advanced entry). Upon acceptance into the program, an applicant is designated as a doctoral student. This designation is changed to doctoral candidate upon successful completion of the doctoral qualifying requirements as well as all the required coursework.

## Program Requirements

In order to pursue an individually designed interdisciplinary engineering graduate program, a student must have been accepted into an approved graduate program that will serve as the administrative home unit for the interdisciplinary engineering program:

- Department of Bioengineering (p. 410)
- Department of Chemical Engineering (p. 425)
- Department of Civil and Environmental Engineering (p. 440)
- Department of Electrical and Computer Engineering (p. 469)
- Department of Mechanical and Industrial Engineering (p. 531)

Students who have been dismissed from any of the COE departments will not be able to enroll into the interdisciplinary engineering PhD program with the department from which they were dismissed as either home or participating department. Successful application for admission to an individually designed interdisciplinary program consists of a written proposal describing the areas of proposed study and research. Part of this proposal will be a list of courses to be taken, a description of the qualifying and comprehensive examination process to be used, a timeline, and any other requirements of the program.

The interdisciplinary engineering PhD requires the commitment by a faculty member at Northeastern to be the advisor of the student and chair of the interdisciplinary committee for the student. This faculty member may or may not be a member of the administrative home unit. The committee must be assembled within the first semester of the program and must include faculty members from all of the participating units. At least two units must be represented on the committee. This committee will be responsible for overseeing the completion of the degree requirements. It will also be responsible for the administrative elements of the program, such as the monitoring of satisfactory progress; the design and grading of the preliminary and comprehensive exams, if applicable; graduation clearance; etc. This interdisciplinary committee is also responsible for an annual review of the progress of the student and for reporting this progress to the administrative home unit on an annual basis.

## Qualifying Examination and Degree Candidacy

Interdisciplinary engineering PhD students must register for and pass the doctoral qualifying examination of their home department. In some cases, if deemed necessary by the interdisciplinary committee, students may be required to take some part of the doctoral qualifying examinations of the other department(s) involved with the student's program of study. To qualify as an interdisciplinary engineering doctoral candidate, students must successfully complete the doctoral qualifying examinations in addition to all their required coursework.

## Dissertation

Students must present their dissertation proposal no more than 12 months after successfully completing their doctoral qualifying examinations. In addition, the presentation of the dissertation proposal and the actual dissertation defense shall be no less than six months apart. Interdisciplinary engineering PhD students must follow the dissertation guidelines of their home department.

## Residency Requirement

After achieving PhD candidacy, students must complete at least two successive semesters of full-time study on campus to establish residency. The total effort for a PhD program involves a minimum of three years of full-time work beyond the bachelor's degree. Students who enter the doctoral program with a Master of Science degree may complete the requirements in less time but should anticipate at least two years of full-time effort.

## Language Requirement

Each doctoral candidate must be proficient in technical writing and oral presentation in the English language. The qualifying examination committee may require additional coursework in the case of any deficiency in these areas.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Direct Entry

Complete all requirements listed below unless otherwise indicated.

### Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

### Requirements

Code	Title	Hours
A minimum of 48 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		48

### Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

### Program Credit/GPA Requirements

48 total semester hours required

Minimum 3.000 GPA required

### Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Advanced Entry

Complete all requirements listed below unless otherwise indicated.

## Milestones

Doctoral qualifying exams (both written comprehensive and oral area exams)  
 Annual review  
 Dissertation committee formation  
 Dissertation proposal  
 Dissertation defense

## Requirements

Code	Title	Hours
A minimum of 20 semester hours of academic coursework is required. Consult your faculty advisors for acceptable courses.		
		20

## Dissertation

Code	Title	Hours
BIOE 9990	Dissertation Term 1	
or CHME 9990	Dissertation Term 1	
or CIVE 9990	Dissertation Term 1	
or EECE 9990	Dissertation Term 1	
or IE 9990	Dissertation Term 1	
or ME 9990	Dissertation Term 1	
BIOE 9991	Dissertation Term 2	
or CHME 9991	Dissertation Term 2	
or CIVE 9991	Dissertation Term 2	
or EECE 9991	Dissertation Term 2	
or IE 9991	Dissertation Term 2	
or ME 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

20 total semester hours required  
 Minimum 3.000 GPA required

## Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

### Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 481)
- Electromagnetics, Plasma, and Optics (p. 482)
- Microsystems, Materials, and Devices (p. 482)

**Optional Thesis**

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		
<b>Option 1 (College of Science thesis advisor)</b>		
PHYS 7990	Thesis (completed twice over two semesters)	8
<b>Option 2 (College of Engineering thesis advisor)</b>		
EECE 7945	Master's Project	
EECE 7990	Thesis	

**Program Credit/GPA Requirements**

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

**ANALYSIS, MODELING, AND COMPUTATION**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7335	Dynamical Processes in Complex Networks	

**ELECTROMAGNETICS, PLASMA, AND OPTICS**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	

EECE 7293	Modern Imaging	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	

**MICROSYSTEMS, MATERIALS, AND DEVICES**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	

**Physics Coursework**

Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7302	Electromagnetic Theory	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7734	Topics: Condensed Matter Physics	

**Climate Science and Engineering, MS****Overview**

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses and includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

### Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below; any core course not used to meet this core course requirement can be taken as a restricted elective:		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5670 or ENVR 5670	Global Biogeochemistry Global Biogeochemistry	
CIVE 7110	Critical Infrastructure Resilience	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below.		12

#### REPORT OPTION

Code	Title	Hours
CIVE 7945 or EEMB 8984	Master's Project Research	4
Complete 8 semester hours from the restricted electives course list below.		8

#### THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
EEMB 8984	Research (Completed twice)	

Complete 4 semester hours from the restricted electives course list below.

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Product Development, MS

Product development is in demand across many technology industries and is widely thought to be the engine of innovation. The Sherman Center for Entrepreneurial Engineering Education is uniquely positioned to offer students a combination of product process and technical skills. The mission of the center is to enable interdisciplinary student entrepreneurship in the broadest sense by providing education about tools, concepts, and resources to foster creativity and the ability to develop commercially viable ideas.

Products ranging from smart devices, to the Internet of Things, to software as a service all require people with product development skills. These positions guide product innovation and lead in crafting products for users. A look at any careers page for any technology firm currently hiring shows many positions open for individuals that have a mix of technical and product development knowledge.

The Master of Science in Product Development program contains a core of courses that span the product development cycle and then allows students to customize the rest of their degree to fit their chosen industry or path. The core courses cover topics such as customer acquisition, technical market analysis, product life cycle, intellectual property, prototyping, iterative development, product design, user testing, and manufacturing.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
GE 5010	Customer-Driven Technical Innovation for Engineers	4
GE 5020	Engineering Product Design Methodology	4
GE 5030	Iterative Product Prototyping for Engineers	4
GE 5100	Product Development for Engineers	4

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
	Complete 16 semester hours from the course list below. (p. 624)	16

### PROJECT OPTION

Code	Title	Hours
GE 7945	Master's Project	4
	Complete 12 semester hours from the course list below. (p. 624)	12

### THESIS OPTION

Code	Title	Hours
GE 7945	Master's Project	4
GE 7990	Thesis	4
	Complete 8 semester hours from the course list below. (p. 624)	8

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

### COURSE LIST

Any course in the following list will serve as an elective course, provided the student satisfies prerequisites and program requirements. Students can take electives outside this list with prior approval from the program director.

Code	Title	Hours
<b>College of Engineering</b>		
BIOE 5250	Regulatory and Quality Aspects of Medical Device Design	
BIOE 5810	Design of Biomedical Instrumentation	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
CSYE 7280	User Experience Design and Testing	
EECE 5155	Wireless Sensor Networks and the Internet of Things	
EECE 5550	Mobile Robotics	
EECE 5552	Assistive Robotics	
EECE 5580	Classical Control Systems	
EECE 5639	Computer Vision	
EECE 5666	Digital Signal Processing	
IE 5617	Lean Concepts and Applications	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6200	Engineering Probability and Statistics	
IE 6500	Human Performance	
IE 7200	Supply Chain Engineering	
IE 7270	Intelligent Manufacturing	
INFO 6660	Business Ethics and Intellectual Property for Engineers	
ME 5245	Mechatronic Systems	
ME 5250	Robot Mechanics and Control	
ME 5645	Environmental Issues in Manufacturing and Product Use	
ME 5650	Advanced Mechanics of Materials	
ME 5659	Control Systems Engineering	

TELE 6510	Fundamentals of the Internet of Things
TELE 6530	Connected Devices
<b>D'Amore McKim School of Business</b>	
ENTR 6240	Emerging and Disruptive Technologies
ENTR 6250	Lean Design and Development
INNO 6200	Enterprise Growth and Innovation
INNO 6230	Platform Innovation
MKTG 6200	Creating and Sustaining Customer Markets
<b>College of Arts, Media and Design</b>	
ARTG 5120	Research Methods for Design
ARTG 5310	Visual Cognition
ARTG 5610	Design Systems
ARTG 5640	Prototyping for Experience Design
ARTG 6310	Design for Behavior and Experience
GSND 5110	Game Design and Analysis
GSND 5122	Business Models in the Game Industry
GSND 5130	Mixed Research Methods for Games
GSND 6320	Psychology of Play
GSND 6340	Biometrics for Design
<b>Bouvé College of Health Sciences</b>	
PT 5321	Applications of Biomechanics in Human Function and Movement
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Graduate Certificate Programs

The College of Engineering offers numerous graduate engineering certificates for professionals at every career stage. These certificates may be completed as stand-alone credentials or in combination with a graduate degree. They typically consist of 16 to 20 semester hours and allow the learner to quickly gain a credential to advance their skills and knowledge, meet an emerging career market need, or add to their professional preparation. In many cases, graduate coursework completed as part of a certificate program may be applied toward a graduate degree in the College of Engineering. Whether you are a working professional seeking new career opportunities, or a full-time graduate student looking to enhance your credentials, our broad and continuously expanding range of certificates are ready to help move your preparation forward.

## Programs

The College of Engineering offers numerous graduate certificates that may be completed alone or in combination with an MS degree. Please see for GSE Certificates Policies and Procedures (p. 405) for detailed information regarding College of Engineering graduate certificates.

### Chemical Engineering

- Process Safety Engineering (p. 440)

### Civil and Environmental Engineering

- Climate and Engineering (p. 467)
- Sustainability Engineering (p. 468)

### Mechanical and Industrial Engineering

- AI Applications (p. 588)
- Data Analytics Engineering (p. 589)
- Energy Systems (p. 589)
- Energy Systems Management (p. 590)
- Renewable Energy (p. 594)
- Sustainable Energy Systems (p. 595)

### Engineering Business

- Engineering Business (p. 591)

## **Engineering Management**

- Engineering Economic Decision Making (p. 592)
- Engineering Management (p. 593)
- Lean Six Sigma (p. 594)
- Supply Chain Engineering Management (p. 596)
- Technology Systems Management (p. 597)

## **Gordon Institute of Engineering Leadership**

- Engineering Leadership (p. 609)

## **Multidisciplinary**

- Blockchain and Smart Contract Engineering (p. 608)
- Software Engineering Systems (p. 596)

## **Telecommunication Networks**

- Broadband Wireless Systems (p. 608)
- IP Telephony Systems (p. 611)

## **Bouvé College of Health Sciences**

Website (<https://bouve.northeastern.edu/>)

**Carmen C. Sceppa, MD, PhD, FGSA, Dean**

**Jennifer Kirwin, PharmD, BCPS, FNAP**, Senior Associate Dean of Academic Affairs

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[Bouve\\_College\\_of\\_Health\\_Sciences@northeastern.edu](mailto:Bouve_College_of_Health_Sciences@northeastern.edu)

Office of Student Services

120 Behrakis Health Sciences Center

617.373.3320

[BouveOGSS@northeastern.edu](mailto:BouveOGSS@northeastern.edu)

The Bouvé College of Health Sciences strongly supports the mission of Northeastern University as a practice-oriented, student-centered, experiential research institution. The college is committed to the goals of the university, which include excellence in education, research, scholarship, clinical practice, experiential learning, access to educational opportunities, and a strong professional orientation.

Bouvé offers students an education in health, health profession fields, and public health that features a curriculum of highly relevant, closely integrated, basic and applied courses in the physical, biological, behavioral, social, environmental, and health systems sciences. Students engage in interprofessional patient care, interdisciplinary translational research, and experiential learning opportunities through service-learning, research, and global experiences.

Bouvé leverages interdisciplinary and interprofessional collaboration to tackle the world's most pressing health challenges. The college seeks to prepare students to become clinicians, researchers, and leaders in healthcare and in the promotion of health of individuals and populations.

Students are provided a broad range of services and programs to ensure their academic success and professional development. Faculty are deeply committed to student success, as students interact with world-class healthcare and educational institutions nationally and globally, to advance health for all.

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## **Academic Policies and Procedures**

The university has published Regulations and Requirements for all graduate programs here.

## PROGRAM STATUS AND PROGRESSION

All degree requirements must be completed within seven years of matriculation, although individual academic programs may require completion in a shorter time frame. Each student is responsible for reviewing the requirements for their particular program. A student's failure or inability to register does not extend the amount of time allowed to complete the program. Students should be registered by the first week of each semester (fall, spring, and, where indicated, summer). Course credits earned in programs of graduate study are valid for a maximum of seven years. A student may request an extension of these time frames from the program director and the Bouvé associate dean for academic affairs.

In order to progress in clinical courses that are sequenced, a student must receive a passing grade in all prior courses in the sequence. In the event that a student fails a clinical course that is not part of a sequence, progression is at the discretion of the student's academic advisor and/or the program director. When a student fails a clinical course that is part of a sequence of courses, the course instructor must notify the Bouvé Office of Student Services. Course material related to the student's failure (e.g., examination reports, clinical reports) must be made available to the student for review.

## ANNUAL REVIEW FOR PHD STUDENTS

The academic progress of each PhD student will be evaluated through an annual review. A copy of each review shall be submitted to the student and the graduate office. If the annual review reports that a student is not making sufficient academic progress, the PhD student will be placed on academic probation. After two consecutive semesters on academic probation, the student may be dismissed from the program. See additional requirements that apply to PhD programs here.

## CONDITIONAL ACCEPTANCE

A student who is accepted conditionally to a graduate program at Bouvé College of Health Sciences must meet the conditions set in the acceptance letter before matriculating into the program. Examples of conditions include receipt of official verification of previous degree completion, completion of missing prerequisite courses, receipt of a missing recommendation, receipt of standardized test scores, and translation of international documents. Students who fail to meet the conditions of their acceptance may be subject to program dismissal.

## ADMISSION AS A SPECIAL STUDENT

Special students are enrolled on a part-time basis (for no more than 6 semester hours per semester) and may accumulate a maximum of 12 semester hours over time. Students interested in taking more than 12 semester hours must make a formal application to a degree program through Northeastern's online application portal (<https://bouve.northeastern.edu/admissions/graduate-admissions/>). Special students who do not register for four consecutive semesters (excluding summer semesters) will be subject to review and possible withdrawal by the Bouvé College of Health Sciences Office of Student Services. Please note, some courses require approval before registration.

## PROGRAM EXTENSION PROCEDURES

Students may seek an extension to complete their program of study only under documented extenuating circumstances. To request an extension, the student must submit the Graduate Program Status Change form along with an action plan to complete the degree requirements to the program director with a copy to the Bouvé Office of Student Services for approval.

## LEAVE OF ABSENCE AND UNIVERSITY WITHDRAWAL

Refer to Leaves of Absence and University Withdrawal in this catalog for more information and policies on leaves of absence and university withdrawals. Individual programs may have additional procedures related to leaves of absence. Consult the program's overview and requirements page in this catalog in addition to the information above. Faculty members are not responsible for notifying the university of a student's withdrawal. For information concerning refund policies, please refer to the Student Financial Services refund page here (<https://studentfinance.northeastern.edu/policies-procedures/refunds-from-credit-balances-withdrawals/>).

## COURSE SUBSTITUTION

A student must obtain approval from their program director to substitute a course. The student must provide official transcripts of completed coursework, accompanied by the respective course syllabi, to their program director. Substitutions will only be made for courses of equivalent credit hours. Once informally approved, the program director must submit a Course Substitution form for processing.

## TRANSFER CREDIT

For general regulations concerning transfer credit in Northeastern's graduate degree programs, please visit Regulations and Requirements for All Graduate Degree Programs.

Students who wish to take a course for transfer at another institution while enrolled at Bouvé should first receive preapproval from their academic advisor and the Bouvé Office of Student Services. Transfer credits from other institutions (or other programs within the university) will only be accepted at the discretion of the student's program. The Graduate Petition to Transfer Credit form can be found at the Office of the University Registrar.

A Bouvé student may not complete coursework at another institution during their last term intending to transfer that credit back to Northeastern to complete the program.

### **ACADEMIC STANDING**

Academic standing in Bouv   is determined by the student's cumulative grade-point average and performance in required academic and clinical courses. All Bouv   students are expected to maintain a cumulative GPA of 3.000 each semester to remain in good academic standing and to progress toward graduation. Students who do not maintain a cumulative GPA of 3.000 each semester will be placed on academic probation—see below.

Each program has its own minimum grade requirements. Please review the program's requirements page in this catalog for details.

Students must submit a petition to their program's academic standing committee, graduate committee, or program director (as applicable) to request:

- A leave of absence.
- A transfer or waiver of credits or preapproval for the course to be taken for transfer (see Graduate Petition to Transfer Credit).
- Directed study (see Individual Instruction Registration).
- A waiver of policy (see department-specific appeal form (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>)).
- A change in program, program status (e.g., full-time to part-time or vice versa), adding or removing concentration, program extension, or change of graduation date. Students should discuss with the program director and the program director will submit a Graduate Program Status Change form.
- A different course of action regarding their academic standing, progression, probation, or dismissal (see department-specific appeal form (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Bouv%C3%A9-Student-Forms.aspx>)).

The petition must include all relevant information. Students may be required to provide extra documentation, such as official transcripts and/or course descriptions. A copy of this action is filed in the student's permanent record in the Bouv   College of Health Sciences Office of Student Services.

### **ACADEMIC PROBATION POLICY**

Academic probation is a period of time when a student must address and remediate academic deficiencies.

A Bouv   graduate student may repeat a course only once to achieve a passing grade and may repeat only two courses during the entire program of study. A student may be on probation for only two semesters, or until the course is offered again, unless the advisor approves an action plan that specifies a longer (but definite) period. A student may only be placed on probation twice during enrollment in Bouv   and must correct all deficiencies, as specified, in each respective action plan during the applicable probationary period. Failure to remediate the deficiency within the agreed time may result in dismissal from the program. During the period of probation, the student must earn a GPA of 3.000 or better each semester, or the student is subject to dismissal from Bouv  . Note that individual graduate programs may have additional requirements that must be included in the probation action plan.

A student will be removed from academic probation after having attained a cumulative GPA of 3.000, earned a passing grade in a repeated course, and/or demonstrated satisfactory performance in a clinical course.

Please refer to the collegewide academic probation procedure linked here (<https://catalog.northeastern.edu/undergraduate/health-sciences/>).

### **ACADEMIC DISMISSAL**

A student may be dismissed from a graduate program when they have failed to maintain academic requirements or have violated a policy that specifies immediate dismissal. All students shall have an opportunity to correct academic deficiencies during an appropriate probationary period before dismissal is instituted, except when the policy specifies "immediate dismissal."

Students may be subject to dismissal from a program under the following conditions. (Note: Additional requirements that are not included in this list, but are specific to the student's major, may also apply.)

- The student exhibits unethical behavior or misconduct in their academic program, practicum, internship, or research.
- The faculty instructor and/or the clinical supervisor determines that the student has demonstrated unsafe or inappropriate behavior in a clinical setting.
- The student does not register for at least one class for two consecutive semesters and does not have an approved leave of absence.
- The student has a cumulative GPA below 3.000 at the end of the probationary period specified by the action plan.
- The student does not demonstrate satisfactory performance in achieving the objectives of a clinical course.
- The student fails to meet all the requirements of the program within the specified time limit mandated by the program and has not been approved for a formal extension.
- The student in a PhD program fails to successfully complete the PhD qualifying/comprehensive exams successfully as stipulated by the program.
- The student fails to progress satisfactorily in research or fails to identify a committee for their thesis or dissertation within the time specified by the policies of the specific program.
- The student has failed to file an action plan within one month of notification of probation.
- The student has failed to meet the requirements of the action plan including any requirements specific to the student's major.
- The student has failed three courses or has failed the same course twice.
- The student has failed to make progress toward degree completion.

### **Dismissal Procedures**

Dismissal of a student from a program is initiated by the program director once the basis for the dismissal is provided to and reviewed by the Bouvé Office of Student Services. The program director will then notify the student of the dismissal. When a student is dismissed from the university, they are not permitted to remain registered for courses in the immediate next academic term. If the university dismissal is successfully appealed, a student may register for classes in the following academic term.

### **COLLEGEWIDE ACADEMIC APPEALS PROCESS**

Please refer to the collegewide appeals process linked here (<https://catalog.northeastern.edu/undergraduate/health-sciences/#undergraduate-health-sciences-college-appeals-policy>).

### **GRADUATION POLICIES**

#### ***Programs that include Completion of a Thesis***

Students completing a thesis as part of the program's academic requirements are required to complete the following at least five business days before the final grade submission deadline for the academic term:

- Upon successful defense of the thesis, the student must have the Thesis Approval form signed by the members of the thesis committee and approved by a representative from the Bouvé Office of Student Services.
- Students must submit an electronic copy of the thesis to ProQuest, following the directions outlined on the University Library website.

#### ***Completion of PhD Programs***

The PhD hooding and degree conferral ceremony is only held during the spring semester. A PhD student may not participate in the ceremony until they have successfully defended their dissertation and completed all academic requirements.

Students completing a dissertation must complete the following at least five business days before the final grade submission deadline for the academic term:

- Upon a successful defense of the dissertation, the student must have the Dissertation Approval form signed by the dissertation committee members.
- The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined in the University Library website.
- The student must complete the PhD Exit form, at which time the Dissertation Approval form will be approved.

### **CURRENT STUDENT RESOURCES**

- BCHS Student Forms
- BCHS Student Handbooks

## **Academic Policies and Procedures**

### **Professional Program Codes of Conduct**

All students are expected to adhere to the Northeastern University Code of Student Conduct (p. 160). Additionally, students are expected to adhere to the Code of Conduct in the following schools or programs with which they are associated:

- Department of Applied Psychology (p. 630) (all programs)
- Department of Communication Sciences and Disorders (p. 630) (all programs)
- Department of Medical Sciences (p. 631) (all programs)
- Doctor of Physical Therapy Program (p. 632)
- School of Nursing (p. 633) (all programs)
- School of Pharmacy and Pharmaceutical Sciences (p. 636) (all programs)

### **Experiential Education Policies**

- Background Checks
- Health Requirements (p. 639)
- Liability Insurance
- Requirements for Clinical, Internships, and Practicum Courses

## Code of Conduct - Department of Applied Psychology

### Professional Behaviors Procedures

The purpose of the professional behaviors procedures is to help remediate students who have been identified as having professional behavior issues in an academic, cooperative, or clinical education setting. Professional standards are outlined in the student manual and may include, but are not limited to, the APA Ethical Principles of Psychologists and Code of Conduct (<https://www.apa.org/ethics/code/>); NASP Professional Standards (<https://www.nasponline.org/standards-and-certification/professional-ethics/>) or CAC Ethical and Professional Standards (<https://www.counseling.org/resources/ethics/>); and the Ethics Code for Behavior Analysts (<https://www.bacb.com/wp-content/uploads/2022/01/Ethics-Code-for-Behavior-Analysts-240201-a.pdf>) to discuss the issue. If the faculty member has met with the student and there is satisfactory resolution of the unprofessional conduct, only a form for tracking purposes is needed.

1. The tracking form shall be stored in SharePoint in order to track these students while they are in the program. Once students graduate, these records should be expunged from SharePoint.
2. A request for committee review, as indicated on the tracking form, must occur under the following conditions:
  - A faculty member has attempted to correct the behavior and it has not been corrected after meeting with the student and taking initial steps to improve the identified professional behavior issues.
  - The incident is egregious (e.g., yelling at a faculty member).
  - A second breach of professional standards has occurred.
4. The chair of the Department of Applied Psychology Academic Standing Committee will review the tracking forms when submitted to determine when a committee review is necessary (see 2, above).
5. Full Review Process:
  - a. The chair of the DAP ASC will send a letter to the student(s) about whom concerns have been raised and instruct each student to complete a Self-Assessment of Professional Behaviors. A meeting date will be set to discuss the concern. If the committee finds there is sufficient evidence to support a violation of the professional standards previously defined, one will be noted in the student's record.
  - b. The DAP ASC will develop an appropriate remediation plan in collaboration with the student and appropriate faculty including the student's advisor.
  - c. Depending on the situation, students may have the opportunity to improve professional behaviors.
  - d. Any of the following may result in a dismissal from the program:
    - A third breach of professional standards
    - A second offense of the same professional standard
    - An egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the relevant codes of professional ethics
6. If a student believes they have been erroneously, capriciously, or otherwise unfairly treated in the process or decision, the student may appeal decisions made by the DAP ASC to the chair of the DAP and then to the dean of the Bouvé College of Health Sciences as outlined in the graduate catalog.
7. If the student has been suspected of cheating or in any way violating the Academic Code of Conduct, the faculty member should complete the tracking form, as well as follow the steps outlined by the Office of Student Conduct and Conflict Resolution.
8. Any concern regarding a student's professional behavior will be brought to the attention of the faculty, as appropriate, at the program faculty meeting.

## Code of Conduct - Department of Communication Sciences and Disorders

### Professional Conduct Violation Review Policy

Students are expected to adhere to standards of professional conduct in academic, cooperative, and clinical education settings. Professional conduct standards are outlined in the American Speech-Language and Hearing Association 2020 Standards and ASHA Code of Ethics, the Code of Student Conduct, the Speech-Language Pathology Clinician Manual, and the Co-op *Student Handbook* (undergraduate students only).

Students who violate professional conduct standards will be referred to the Communication Sciences and Disorders Academic Standing Committee for review. If the committee finds there is sufficient evidence to support the violation, outcomes will be determined based on the nature of the violation; a student may or may not be required to meet with the ASC during the review. Upon a reported third violation, the student will be required to meet with

the CSD ASC; outcomes will be shared with the student, program director, program manager, Bouvé Office of Student Services representative, CSD academic advisor, and department chair. An egregious breach of a professional standard may result in immediate dismissal from the program. If a student is dismissed from the program, they will be advised to immediately unenroll in any current and future enrolled didactic or clinical courses.

If a student believes they have been erroneously, capriciously, or otherwise unfairly treated with the decision of the ASC, students may pursue appeals as outlined in the collegewide appeals process.

## Code of Conduct - Department of Medical Sciences

### Professional Code of Conduct

Healthcare professionals are required to adhere to rigorous standards of professional behavior. Professionalism is not just a concept but a tangible aspect of students' academic journey. The department values the early recognition of positive behaviors and eliminating unprofessional behaviors. This proactive approach benefits the student, the student body, the program, the department, and the healthcare community. Eliminating unprofessional behavior ensures that students progress through the program with adequate knowledge and clinical skills to meet the program's standards and demonstrate behaviors necessary for professional practice as a healthcare team member.

Students are expected to demonstrate professional behavior in all academic, nonacademic, and extracurricular activities on and off campus. The professional conduct code applies to any situation affecting a student's fitness for continued enrollment or entry into professional practice.

Students who engage in significant or repeated unprofessional conduct will be referred to the Department of Medical Sciences Academic Standing Committee for a hearing. Students may face consequences that include, but are not limited to, required remediation, repetition of coursework, repetition of a course, deceleration in the program, or dismissal from the program. An egregious violation of professional standards, including during didactic or clinical experiences, may result in immediate dismissal from the program.

If a student believes they have been erroneously, capriciously, or otherwise unfairly treated by the decision of the ASC, graduate students may pursue appeals as outlined in the collegewide appeals process (p. 629).

### STATEMENT OF PROFESSIONAL BEHAVIOR

Students are expected to exhibit professionalism through dedication, accountability, and respect. This includes being punctual, reliable, open to feedback, and maintaining integrity and teamwork in all academic and professional interactions. Such behaviors foster a respectful and productive environment that supports excellence and collaboration.

The following is an illustrative, nonexhaustive list of common examples of expected professional behavior.

#### Scholarship and Commitment to Excellence

Students are expected to demonstrate high dedication to their academic and professional responsibilities. This includes:

- Consistently attend all classes, required activities, appointments, and meetings on time.
- Submit assignments by deadlines.
- Participate in a manner that is respectful and conducive to learning without causing disruptions.
- Take initiative in fulfilling responsibilities without needing continuous reminders.
- Demonstrate behaviors that promote and reflect a commitment to academic excellence and scholarly pursuits.

#### Accountability and Initiative

Students are expected to:

- Accept responsibility for actions, including any mistakes or errors.
- Complete tasks and responsibilities in a timely and reliable manner.
- Address and correct inappropriate behavior in themselves and others.
- Show initiative and accountability in academic and professional roles, and actively seek ways to contribute positively.

#### Self-Growth and Self-Care

Students are expected to:

- Be open to and actively seek constructive feedback to improve performance.
- Demonstrate awareness of one's limitations and be willing to seek help.
- Implement recommendations from faculty and others to enhance learning and performance.
- Demonstrate adaptability and flexibility in various environments, including patient care and classroom settings.
- Maintain personal health and avoid behaviors that could be harmful to personal well-being.
- Take ownership and initiative for self-growth and self-care.

#### Responsibility and Sense of Duty

Students are expected to:

- Adhere to all relevant policies, procedures, and instructions.
- Dress appropriately for professional settings, including patient care and research environments.
- Exhibit a strong sense of duty and responsibility in all professional undertakings.

#### ***Compassion and Respect for Others***

Students are expected to:

- Respect the rights of others in both academic and professional settings.
- Demonstrate compassion and respect in interactions with others.
- Establish and maintain appropriate boundaries with patients, family members, community-based mentors, fellow students, faculty, and staff.
- Demonstrate equal respect for all individuals, regardless of race, gender, religion, sexual orientation, age, or socioeconomic status.
- Uphold the confidentiality rights of patients and others.

#### ***Integrity and Trustworthiness***

Students are expected to:

- Provide accurate and truthful information in all academic, professional, research, and administrative settings.
- Operate within the scope of one's role and responsibilities in academic, professional, research, and administrative settings.
- Avoid using their professional position for personal gain.
- Demonstrate behaviors that reflect high integrity and trustworthiness.

#### ***Teamwork and Professional Demeanor***

Students are expected to:

- Collaborate effectively within healthcare and research teams.
- Demonstrate sensitivity to the needs and requests of team members.
- Demonstrate the ability to collaborate with students, faculty, and staff in various settings.
- Dress appropriately for professional environments, including patient care and research settings.
- Exhibit a professional demeanor and behaviors that support teamwork and collaboration.

#### ***Concern for the Welfare of Patients, Research Integrity, and Altruism***

Students are expected to:

- Act in the best interest of patients and always uphold research integrity.
- Show sensitivity to the needs, values, and perspectives of patients, family members, caregivers, and research participants.
- Establish and maintain appropriate rapport with patients, family members, caregivers, and the research team.
- Demonstrate cultural humility with openness and responsiveness to the ethnic and cultural backgrounds of patients and others.
- Respond to patient needs in a timely, safe, and effective manner.
- Respect patient privacy and ensure research integrity.

By adhering to these expectations, students will contribute to a professional and respectful environment that fosters learning, collaboration, and the highest standards of academic and professional excellence.

## Code of Conduct - DPT Program

### **Doctor of Physical Therapy Program—Professional Behaviors Policy**

In order to promote professional skills in the classroom, local and global communities, and clinical settings, the physical therapy program requires the demonstration of professional behaviors in accordance with the professional behaviors policy. The purpose of professional behavior procedure is to help remediate students who have been identified as having professional behavior issues in an academic, cooperative, or clinical education setting. Professional skills standards are outlined in the student handbook and may include, but are not limited to, the Professional Behaviors Guidelines, Dress Code Guidelines, APTA Code of Ethics for the Physical Therapist, and/or the APTA Guide for Professional Conduct.

1. Any faculty members who have a concern about a student's professional behavior will arrange to meet with the student to discuss the issue. If the faculty member has met with the student and there is satisfactory resolution of the unprofessional conduct, only a form for tracking purposes is needed.
2. The tracking form shall be kept on record in order to track these students while they are in the program.
3. A request for committee reviews as indicated on the tracking form must occur under the following conditions:
  - a. A faculty member has attempted to correct the behavior and it has not been corrected after meeting with the student and taking initial steps to improve the identified professional behavior issues.

- b. The incident is egregious (i.e., yelling at a faculty member).
- c. A second breach of professional standards has occurred.

4. Full Review Process:

- a. The chairperson of the Physical Therapy Movement and Rehabilitation Sciences Academic Affairs Committee will send a letter to students about whom concerns have been raised and instruct each student to complete a Self-Assessment of Professional Behaviors. A meeting date will be set to discuss the concern. If the AAC finds there is sufficient evidence to support a violation of the professional standards previously defined, one will be noted in the student's record.
- b. The AAC will develop an appropriate remediation plan in collaboration with the student and appropriate faculty.
- c. Depending on the situation, students may have the opportunity to improve professional behaviors.
- d. Any of the following may result in a dismissal from the program:
  - i. A third breach of professional standards
  - ii. A second offense of the same professional standard
  - iii. An egregious breach of professional standards as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

5. If a student believes that they have been erroneously, capriciously, or otherwise unfairly treated in the process or decision, they may appeal decisions using the process outlined in the Collegewide Appeals Process (<https://catalog.northeastern.edu/undergraduate/health-sciences/#undergraduate-health-sciences-college-appeals-policy>).

- a. The next level of appeal would be to the PTMRS department chairperson.
- b. If the student is not satisfied with the disposition of the matter after the department chairperson decision, the next level of appeal would be the Bouvé College AAC. The committee will notify the student of the findings and recommended decision. The college dean will have the final decision.
- c. If the student is not satisfied with the college's disposition of the matter or if the appeal is not resolved within the timeline outlined in the Academic Appeals Policies and Procedures, the student may appeal to the university level, as outlined in this catalog.

6. If the student has been suspected of cheating or in any way violating the Academic Code of Conduct, the faculty member should complete the tracking form as well as follow the steps outlined by the Office of Student Conduct and Conflict Resolution.

7. Any concern regarding students' professional behavior will be brought to the attention of the faculty as appropriate at the faculty meeting.

## Code of Conduct - School of Nursing

### Expectations for Professionalism

The School of Nursing expects all students, faculty, and staff to conduct themselves in a professional manner. All individuals are expected to represent the school; the preprofessional, professional, and graduate programs; and the profession in a positive, professional manner.

Violation of the School Code of Professional Conduct or of any of the professions' codes of ethics is considered professional misconduct.

Academic misconduct, while also considered a form of professional misconduct, may be adjudicated as outlined in the Northeastern University Code of Student Conduct (updated annually). Additionally, academic misconduct may be reviewed under the terms of this SCPC.

#### 1. Scope of Policy

The SCPC applies to all students enrolled in any of the School of Nursing's academic programs, including participants in courses, research, programs, events, and activities affiliated with, sponsored by, or sanctioned by the School of Nursing. In addition, the SCPC is applicable to all student nonacademic and extracurricular activities (regardless of whether such activities take place on or off campus) that have had or have the potential to have an adverse impact on Northeastern University, the Bouvé College of Health Sciences, the School of Nursing, faculty, staff, students, or patients and staff at affiliated experiential education sites, or may affect a student's fitness for continued enrollment in the School of Nursing or entry into professional practice in nursing.

Reports and actions related to the SCPC should be directed immediately to relevant faculty and the School of Nursing's assistant dean of undergraduate programs and/or assistant dean of graduate programs. Specific questions requiring interpretations of the meaning of any provision of the SCPC will be provided by the assistant deans and/or dean of the School of Nursing as needed.

Students in the School of Nursing are also required to comply with terms of the Northeastern University Code of Student Conduct as well as the following:

- The Massachusetts Board of Registration in Nursing Good Moral Character licensure requirement (<https://www.mass.gov/info-details/good-moral-character-requirements-for-nursing-licensure/>)
- The ANA Code of Ethics ([http://nursingworld.org/ethics/code/protected\\_nwcoe813.htm](http://nursingworld.org/ethics/code/protected_nwcoe813.htm))

## **2. Professional Misconduct**

The following is an illustrative, nonexhaustive list of some common examples of professional misconduct and does not represent all potential infractions:

- Violation of expected terms of conduct described in course policies or syllabi or as otherwise articulated in writing by the instructor.
- Actions or behaviors that violate school, professional, research, or ethics codes of conduct (e.g., professional ANA Code of Ethics or BORN Good Moral Character).
- Entering a classroom, laboratory, seminar, or experiential setting habitually late or arriving late or leaving early for a professional activity without prior permission from the instructor.
- Addressing (oral and written) faculty, staff, students, preceptors, practitioners, or patients in an unprofessional, disrespectful, and inconsiderate manner.
- Wearing unprofessional attire (note expectations in the professional program, class, and/or experiential education policies and guidelines) during on-campus learning activities including classes, laboratories, and seminars, or during experiential education activities or school-sanctioned professional events.
- Bringing family members, guests, and pets to the learning/research environment or professional academic activities without prior consent of the instructor.
- Accessing without proper authorization or revealing confidential information about faculty, staff, students of the school, college, or university.
- Accessing without proper authorization or revealing confidential information in any practice/research/learning setting.
- Using electronic resources and communication systems in a manner that is irresponsible, inappropriate, or disruptive to oneself or others. This includes but is not limited to inappropriate use of cellphones, computers, tablets, email, instant messaging, social media, blogs, and websites. Refer to the university's Policy on the A (<https://policies.northeastern.edu/policy700/>)ppropriate Use of Computer and Network Resources (<https://policies.northeastern.edu/policy700/>).
- Endangering patients or colleagues in/outside the university, damaging their property, or compromising research integrity.
- Acquiring unexcused absences and/or unexcused tardiness for clinical and/or simulation experiences and/or assigned laboratory experiences.
- Failure to complete assigned lab or clinical hours.
- Failure to communicate effectively with nursing practicum preceptors and clinical instructors as described in your course syllabi.
- Failure to submit clinical onboarding materials or clinical compliance materials by the due date regardless of reminders.
- Other activity that, at the discretion of the School of Nursing consistent with the procedures outlined below, constitutes unprofessional conduct.

## **3. Procedures of Reporting**

### **Definitions**

#### *Professionalism Concern Form*

Intended to be used to report an instance of or patterns of unprofessional behavior exhibited by a student. The submitted/completed forms will be maintained in a confidential file shared only by leadership and advisors.

#### *Administrative Professional Conduct Board (at a minimum three members)*

Comprised of the assistant deans of undergraduate and graduate nursing programs and/or designee, appropriate program director, and a School of Nursing professional staff member. Other School of Nursing representatives may be invited as deemed appropriate. An academic advisor and/or the assistant dean of student services from the Bouvé College of Health Sciences Office of Student Services may also be invited.

#### *Academic Standing Committee*

The Academic Standing Committee is a standing committee within the School of Nursing that reviews cases in which students may be suspended or dismissed from the School of Nursing for violations of this policy.

### **Procedure**

The School of Nursing's professional misconduct review shall run concurrently with any other applicable university procedures including, but not limited to, academic and disciplinary proceedings administered by the university's Office of Student Conduct and Conflict Resolution. The assistant deans, the Administrative Professional Conduct Board, or the Academic Standing Committee may, at their discretion, indefinitely suspend or terminate any proceeding already instituted hereunder if they feel another procedure has or will adequately address the concern(s) raised regarding the reported unprofessional behavior.

#### **Preliminary Review**

Any faculty member, staff member, employer/preceptor, or student who believes a student has engaged in unprofessional behavior should complete the PCF using the link in the Canvas homeroom pages and report the matter to the appropriate assistant dean, who may then determine what preliminary action, if any, is needed.

#### **Formal Review**

The assistant dean is alerted via email when a new PCF form is added to the confidential file. The assistant dean will convene the Administrative Professionalism Conduct Board in a timely manner if deemed necessary to decide on an appropriate course of action to address the reported misconduct. Such course of action may include, but is not limited to, a meeting among the student, the assistant dean, and the Administrative Professionalism Conduct Board and/or the Academic Standing Committee; counseling for the student on professional conduct; remediation by the student to address the effect of their unprofessional conduct; and other steps deemed appropriate by the assistant dean and/or the Administrative Professionalism Conduct Board. The student will be notified about the PCF before an action takes place or a decision is rendered by the Administrative Professionalism Conduct Board.

Reported misconduct that may subject a student to suspension or dismissal from an academic program must be forwarded to the Academic Standing Committee. For example, a student who has three or more PCFs on file will be reported to the Academic Standing Committee for further action/recommendation. Additionally, any report of serious professional misconduct—whether a student's first, second, or third—may, at the discretion of the Administrative Professionalism Conduct Board, be reported to the Academic Standing Committee for that committee's review and potential action.

#### **Retention of Records**

PCFs and documents memorializing the resolution of the misconduct reported are kept in the confidential file. This record does not appear on unofficial or official school transcripts. Such professionalism-related documents will be destroyed upon the student's graduation except in the following circumstances:

- The reported misconduct resulted in the student's suspension or dismissal from the program or School of Nursing.
- The report is otherwise required to be retained by applicable university policies or procedures.

#### **SCPC Implications on Student Organizations Leadership, Professional Societies, and Awards**

Existing membership, leadership, and society engagement:

- Students who are current members of student groups, professional societies, and/or organizations are expected to notify all relevant parties (e.g., faculty advisor, national office, etc.) regarding the outcome of the SCPC violation. This communication is expected to occur within 10 university business days from the student's Administrative Professional Conduct Board/ Academic Standing Committee meeting date (with a CC) to the assistant dean. This is critical if the professional student organization/society's national bylaws or constitutions include language requiring a member to be in good academic/professional standing. Communicating with the faculty advisor and national office to seek guidance on the implications of the misconduct on the student's continued membership and/or its impact on a student's leadership position, when relevant.

New membership, leadership, society engagement, and professional awards/recognitions:

- Students who apply for new membership in professional societies/organizations and awards can expect their application to be reviewed through the assistant dean in light of SCPC violations. Students who have been found responsible for unprofessional behaviors may be removed from consideration, based on eligibility criteria of the award/recognition and/or membership requirements.

### **4. Academic Standing Committee**

The purpose of the Academic Standing Committee is to provide students with an impartial review of reported violations of this policy that may warrant suspension or dismissal from the program. The Academic Standing Committee will meet each semester or as needed to respond to reported concerns of students' unprofessional behaviors. This committee may also implement changes to these policies and procedures at any time.

## **5. Hearing**

A hearing date will be set by the applicable committee to discuss the reported concern. If a committee finds that there is sufficient evidence to support a violation of the professional standards previously defined, this will be so noted in the student's record. The applicable committee will develop an appropriate remediation plan in collaboration with the student and appropriate faculty and staff.

Third parties, including but not limited to witnesses, lawyers, parents, guardians, spouses, partners, and friends, are not permitted to attend the hearing.

## **6. Appeals**

Within 10 university business days of receiving the written notification of the Academic Standing Committee's decision, the student may submit a written appeal of the decision or the sanction (or both) to the dean of the School of Nursing. Appeals must be based on at least one of the following arguments:

- There were violations of procedure that seriously compromised the investigation and/or conclusions.
- The evidence presented to the committee clearly does not support the findings.
- The sanctions implemented by the committee are excessive relative to the violation.
- There is significant new evidence that was not reasonably available during the investigation.

The dean of the School of Nursing will determine if the appeal meets the above conditions. The dean will issue a written report with their decision within 10 university business days of receiving the appeal. Students who have evidence that they were erroneously, capriciously, or otherwise unfairly treated in a professional conduct decision may petition to appeal the decision via the college-level appeals to the Bouvé College of Health Sciences Academic Affairs Committee as detailed in the catalog (<https://catalog.northeastern.edu/undergraduate/health-sciences/#undergraduate-health-sciences-college-appeals-policy>).

## **7. Proceedings for Registered Student Club or Organization**

Student organizations may also be held responsible for violations of the SCPC. A review for a registered student organization shall be conducted in a manner like procedures used in cases involving individual students. A review shall be conducted with one spokesperson from the organization (usually the organization's president). Sanctions may be imposed upon a registered student organization for a violation of the SCPC in the same manner and using the same considerations as on individuals.

## **Code of Conduct - School of Pharmacy and Pharmaceutical Sciences**

### **Expectations for Professionalism**

The School of Pharmacy and Pharmaceutical Sciences expects all students, faculty, and staff to conduct themselves in a professional manner. All individuals are expected to represent the school; the preprofessional, professional, and graduate programs; and the profession in a positive, professional manner.

Violation of the School Code of Professional Conduct or of any of the professions' codes of ethics is considered professional misconduct.

Academic misconduct, while also considered a form of professional misconduct, may be adjudicated as outlined in the Northeastern University Code of Student Conduct (updated annually). Additionally, academic misconduct may be reviewed under the terms of this SCPC.

#### **1. Scope of Policy**

The SCPC applies to all students enrolled in any of the SOPPS's academic programs, including pre-pharmacy and participants in courses, research, programs, events, and activities affiliated with, sponsored by, or sanctioned by the SOPPS. In addition, the SCPC is applicable to all student nonacademic and extracurricular activities (regardless of whether such activities take place on or off campus) that have had or have the potential to have an adverse impact on Northeastern University, the Bouvé College of Health Sciences, the SOPPS, faculty, staff, students, or patients and staff at affiliated experiential education sites, or may affect a student's fitness for continued enrollment in the SOPPS or entry into professional practice in pharmacy and pharmaceutical sciences.

Reports and actions related to the SCPC should be directed immediately to relevant faculty and the SOPPS's Office of Student Affairs's assistant dean of student affairs. Specific questions requiring interpretations of the meaning of any provision of the SCPC will be provided by the dean of the SOPPS as needed.

Students in the SOPPS are also required to comply with terms of the Northeastern University Code of Student Conduct.

#### **2. Professional Misconduct**

The following is an illustrative, nonexhaustive list of some common examples of professional misconduct and does not represent all potential infractions:

- Violation of expected terms of conduct described in course policies or syllabi or as otherwise articulated in writing by the instructor.

- Actions or behaviors that violate school, professional, research, or ethics codes of conduct (e.g., professional Oath of the Student Pharmacist or Board of Registration in Pharmacy expectations, applicable laws (HIPPA, FERPA, etc.)).
- Entering a classroom, laboratory, seminar, or experiential setting habitually late or arriving late or leaving early for a professional activity without prior permission from the instructor.
- Addressing (oral and written) faculty, staff, students, preceptors, practitioners, or patients in an unprofessional, disrespectful, and inconsiderate manner.
- Wearing unprofessional attire (note expectations in the professional program, class, and/or experiential education policies and guidelines) during on-campus learning activities including classes, laboratories and seminars, or during experiential education activities or school-sanctioned professional events.
- Bringing family members, guests, and pets to the learning/research environment or professional academic activities without prior consent of the instructor.
- Accessing and/or distributing without proper authorization or revealing confidential information about faculty, staff, students of the school, college, or university.
- Accessing and/or distributing without proper authorization or revealing confidential information in any practice/research/learning setting.
- Using electronic resources and communication systems in a manner that is irresponsible, inappropriate, or disruptive to oneself or others. This includes, but is not limited to, inappropriate use of cellphones, computers, tablets, email, instant messaging, social media, blogs, and websites. Refer to the university's Policy on (<https://policies.northeastern.edu/policy700/>)Appropriate Use of Computer and Network Resources.
- Endangering patients or colleagues in/outside the university, damaging their property, or compromising research integrity.
- Other activity that, at the discretion of the SOPPS consistent with the procedures outlined below, constitutes unprofessional conduct.

### ***3. Procedures of Reporting***

#### ***Definitions***

##### ***Professionalism Concern Form***

Intended to be used to report an instance of or patterns of unprofessional behavior exhibited by a student . The submitted/completed forms will be maintained in a confidential manner in the SOPPS Office of the Dean.

##### ***Administrative Professional Conduct Board (at a minimum three members)***

Comprised of the assistant dean and/or Office of Student Affairs designee, the assistant dean of experiential and continuing professional education and/or designee, the director of graduate studies and/or designee, the director of undergraduate and professional programs and/or designee, and a SOPPS professional staff member. Other SOPPS representatives may be invited as deemed appropriate. An academic advisor and/or the assistant dean of student services from the Bouvé College of Health Sciences Office of Student Services may also be invited.

##### ***Academic Standing Committee***

The ASC is a standing committee within the SOPPS that reviews cases in which students may be placed on probation, suspended, or dismissed from the SOPPS for violations of this policy.

#### ***Procedure***

The SOPPS's professional misconduct review shall run concurrently with any other applicable university procedures including, but not limited to, academic and disciplinary proceedings administered by the university's Office of Student Conduct and Conflict Resolution. The assistant dean, the APCB, or the ASC may, at their discretion, indefinitely suspend or terminate any proceeding already instituted hereunder if they feel another procedure has or will adequately address the concern(s) raised regarding the reported unprofessional behavior.

#### ***Preliminary Review***

Any faculty member, staff member, employer/preceptor, or student who believes a student has engaged in unprofessional behavior should report the matter to the assistant dean and/or an Office of Experiential and Continuing Professional Educational/co-op member who may then determine what preliminary action, if any, may be taken to address the reported issue. The assistant dean and/or OECPE/co-op team member will make a determination consistent with the expectations stated herein whether the preliminary action, if any, is sufficient to address the reported unprofessional behavior or the matter should be forwarded for further consideration consistent with the procedures outlined below (formal review). If forwarded for further consideration, the reported unprofessional conduct must be reduced to writing using a PCF. If the reported unprofessional conduct has not, in the assistant dean's assessment, been corrected after meeting with the student, or if a second breach of professional expectations occurs, a second PCF must be completed and forwarded for further consideration as outlined below.

### **Formal Review**

A completed PCF will be delivered to the assistant dean for review. Upon receipt of the form, the assistant dean will convene the APCB in a timely manner to decide on an appropriate course of action to address the reported misconduct. Such course of action may include but is not limited to a meeting among the student, the assistant dean, and APCB and/or ASC; counseling for the student on professional conduct; remediation by the student to address the effect of their unprofessional conduct; and other steps deemed appropriate by the assistant dean and APCB. The student will be notified about the PCF before an action takes place or a decision is rendered by the APCB and/or ASC. A student who is invited to meet with the APCB or the ASC must download/print a copy of this document, **read it in its entirety, and bring it to the meeting.**

Reported misconduct that may subject a student to suspension or dismissal from an academic program must be forwarded to the ASC. For example, a student who has three or more PCFs on file will be reported to the ASC for further action/recommendation. Additionally, any report of serious professional misconduct—whether a student's first, second, or third—may, at the discretion of the APCB, be reported to the ASC for that committee's review and potential action.

Any SCPC violation will result in, at minimum, an automatic one academic (didactic course, nonexperiential) semester probationary period. If at the end of the academic semester no additional SCPC violations have transpired, then the probationary period will be automatically lifted.

### **Retention of Records**

PCFs and documents memorializing the resolution of the misconduct reported on such form(s) will be placed in the student's academic file to remain within the SOPPS's Office of Student Affairs assistant dean; this record does not appear on unofficial or official school transcripts. Such professionalism-related documents will be destroyed upon the student's graduation except in the following circumstances:

- The reported misconduct resulted in the student's suspension or dismissal from the program or SOPPS.
- The student had three or more reported incidents of professional misconduct.
- The report is otherwise required to be retained by applicable university policies or procedures.

### **SCPC Implications on Student Organizations Leadership, Professional Societies, and Awards:**

**Existing** membership, leadership, and society engagement:

- Students who are current members of student groups, professional societies, and/or organizations are expected to notify all relevant parties (e.g., faculty advisor, national office, etc.) regarding the outcome of the SCPC violation. This communication is expected to occur within 10 university business days from the student's APCB/ASC meeting date (with a CC:) to the assistant dean. This is critical if the professional student organization/society's national bylaws or constitutions include language requiring a member to be in good academic/professional standing. Communicating with the faculty advisor and national office to seek guidance on the implications of the misconduct on the student's continued membership and/or its impact on a student's leadership position, when relevant.

**New** membership, leadership, society engagement, and professional awards/recognition:

- Students who apply for new membership in professional societies/organizations and/or national, university, college, school awards can expect their application to be reviewed through the SOPPS Office of Student Affairs assistant dean in light of SCPC violations. Students who have been found responsible for unprofessional behaviors may be subject to removal from consideration, based on eligibility criteria of the award/recognition and/or membership requirements. Eligibility is subject to the probationary period described previously (see Formal Review).

### **4. Academic Standing Committee**

The purpose of the ASC is to provide students with an impartial review of reported violations of this policy that may warrant suspension or dismissal from the program. The ASC will meet each semester or as needed to respond to reported concerns of students' unprofessional behaviors. This committee may also implement changes to these policies and procedures at any time.

### **5. Hearing**

A hearing date will be set by the applicable committee (APCB/ASC) to discuss the reported concern. If a committee finds that there is sufficient evidence to support a violation of the professional standards previously defined, this will be so noted in the student's record. The applicable committee will develop an appropriate remediation plan in collaboration with the student and appropriate faculty and staff.

Third parties, including but not limited to witnesses, lawyers, parents, guardians, spouses, partners, and friends, are not permitted to attend the hearing.

### **6. Appeals**

Within 10 university business days of receiving the written notification of the ASC's decision, the student may submit a written appeal of the decision or the sanction (or both) to the dean of the SOPPS. Appeals must be based on at least one of the following arguments:

- There were violations of procedure that seriously compromised the investigation and/or conclusions.
- The evidence presented to the committee clearly does not support the findings.
- The sanctions implemented by the committee are excessive relative to the violation.
- There is significant new evidence that was not reasonably available during the investigation.

The dean of the SOPPS will determine if the appeal meets the above conditions. The dean will issue a written report regarding their decision within 10 university business days of receiving the appeal.

Students who have evidence that they were erroneously, capriciously, or otherwise unfairly treated in a professional conduct decision may petition to appeal the decision via the college-level appeals to the Bouvé College of Health Sciences Academic Affairs Committee as detailed in the catalog (<https://catalog.northeastern.edu/undergraduate/health-sciences/#undergraduate-health-sciences-college-appeals-policy>).

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### **Background Checks**

Clinical education sites require background checks and/or drug screenings for employees, as well as for students who come to their facilities. All Northeastern University students will need to have background checks/drug screenings completed if their assigned clinical placement requires it. The college contracts with third-party vendors (such as Universal Background Screening, American DataBank, etc.) to perform these checks and screenings. These companies charge fees to conduct background checks/screenings, depending on the type of background check/screening needed. Students are responsible for any fees charged by companies conducting background checks/screenings.

All background check information is confidential. Results are posted to the company website in a secure, protected environment. A student may view their results online using a password. A student will be contacted by their program director, chair, or assistant dean if there is a question about the results. Neither a student nor the company is required to reveal the actual results of the background check to the clinical site. However, a student may be unable to be placed at that clinical site based on the site's requirements.

If an assigned clinical site requires a student to have a background check/screening, the on-campus clinical coordinator/clinical placement office will post the requirements and provide instructions and a deadline for completing the check. To ensure adequate processing time prior to the start of the clinical experience, it is crucial that the check be completed in advance of the deadline given. Failure to complete the check in a timely manner could jeopardize progression in the academic program.

***These policies and/or procedures apply to Bouvé's undergraduate and graduate students.***

### **Health Requirements**

Students must comply with any universitywide health requirements (<https://catalog.northeastern.edu/undergraduate/information-entering-students/health-requirements-uhcs/>).

As a condition of matriculation at Northeastern University, all students are required to submit the completed University Health Report form. Consult the UHCS website (<https://uhcs.northeastern.edu/forms/university-health-report/>) for instructions and deadlines to submit the University Health Report form. UHCS may block the registration of those students who do not file the required form(s).

### **Clinical Clearance**

Based on clinical education site requirements and associated clinical affiliation agreements, some programs in the Bouvé College of Health Sciences will require additional medical documentation and health certification. Additional requirements may include, but are not limited to, exam or statement of good health prior to registration, annual proof of physical examination, and/or proof of additional immunities. This "clinical clearance" may be required by some programs prior to engaging in clinical, internship, or fieldwork. Students should review the UHCS website (<https://uhcs.northeastern.edu/forms/>) for general information about clinical clearance as well as consult their major/program handbook and/or consult their program's director or clinical placement coordinator for more information.

***These policies and/or procedures apply to Bouvé's undergraduate and graduate students.***

## Liability Insurance

Students on clinicals, clinical practicum, or clinical internships, under a clinical agreement with Northeastern University, are covered by Northeastern's liability insurance program for claims arising out of the student performing assigned duties in the scope of their studies. Students should consult their clinical placement office, program director, and program policies for more information about liability insurance. If students have questions about their placement and the insurance provided, they may contact Risk Services (<https://risk-services.sites.northeastern.edu/>).

## Requirements for Clinical, Internships, and Practicum Courses

- Some Bouvé programs require courses with clinical, internship, or fieldwork components. Such components are offered at affiliated hospitals, clinics, schools, medical facilities, or other institutions and involve contractual agreements with these institutions or sites.
- Some Bouvé programs have cooperative education requirements. Students secure co-ops through a job search process and are employees of an institution while on co-op. Co-op students are subject to the policies, procedures, and requirements of their employers.
- Northeastern University is affiliated with numerous clinical sites across the country and around the world. Depending on the program, students may be required to travel outside of Massachusetts to complete clinical courses. Students are responsible for any costs associated with transportation and/or housing.
- Evaluation for clinical courses will be based on established guidelines and policies that students will receive prior to and/or during the clinical component. Periodic performance evaluations will take place during the course of the academic term. See specific program clinical policies and procedures, handbooks, or course syllabi for details.
- In order to enroll students in university-sponsored accidental injury insurance, elements of students' demographic information (including date of birth, address, and phone number) will be communicated via a university-contracted third-party clinical database to Risk Services and to the company providing the coverage. In addition, programs may use elements of a student's demographic information in the process of site onboarding. Students may refer to the university privacy policy (<https://www.northeastern.edu/privacy-information/>) and contact their program director or clinical placement office for more details.

## Student Conduct

- Students assigned to an institution or site for instruction are expected to adhere to the rules and regulations of that institution. Failure to adhere to these rules may result in dismissal from that institution or site.
- Students should be aware that, while participating in any form of clinical practice, they continue to be under the jurisdiction of the university. Any breaches of conduct committed by a student in a clinical setting that would be a violation of the university Code of Student Conduct (p. 160) or relevant unit-specific Professional Program Code of Conduct (p. 629) shall also be considered a cause for disciplinary action against the student.
- All students are required by federal and state law to respect the confidentiality of the patients' and/or students' records under the Health Insurance Portability and Accountability Act and/or Family Educational Rights and Privacy Act, respectively, to which they may be privy. This includes, but is not limited to, patient/student identity and identifiers, diagnostic tests performed, medical history, special needs, and medications prescribed. For more information, students should contact their on-campus clinical education coordinator and/or clinical education site coordinator.

## Health Clearance, Background Check, and Training Requirements

- Evidence of health clearance is required for experiential courses (including clinicals, internships, and practicums) in their field of study. All students, regardless of age, must have a current physical exam, tuberculin test, and documentation of immunity on file at University Health and Counseling Services (<https://uhcs.northeastern.edu/>) and provide such documentation to their on-campus clinical coordinator/clinical placement office as requested.
- Students must meet the health clearance requirements of their academic program and any site-specific requirements prior to entering the clinical setting. This means that students must make arrangements for their physical exams and immunizations months before they are scheduled for a clinical course or rotation. Students who do not present the appropriate health certification will be prohibited from attending a clinical course or rotation until satisfactory evidence is provided. Students who do not meet site-specific requirements may not be able to pass a clinical course and risk their ability to complete the degree program.
- Some programs use clinical clearance software packages (such as Exxat, Complio, or CastleBranch) to ensure compliance with health clearance requirements. In these cases, students are responsible for software account fees. Fees will be paid by the student directly to the software company. More specific guidelines are available from UHCS or from the individual program's clinical placement office. Guidelines are updated periodically, and students must meet the most current guidelines or they will not be allowed into a clinical area.
- School of Nursing students must provide evidence of health documentation utilizing an immunization tracker in order to ensure that documents are updated on a yearly basis. All fees required for the immunization tracking will be paid by the student directly to the tracking service.
- In preparation for clinical education experiences, all students will complete on-site training in universal precautions and safe practices offered by the Office of Academic and Research Safety (<https://oars.northeastern.edu/>) or training vetted and approved by the Office of Environmental Health and Safety and offered by their program. Students must also complete an annual online refresher course in blood-borne pathogens exposure.

- Students may be required to complete background checks/drug screening prior to engaging in clinical, internship, or fieldwork courses as outlined in this catalog (p. 639).

### POLICIES FOR INTERNATIONAL STUDENTS

- Students in F-1 visa status must consult with the university's Office of Global Services (<https://international.northeastern.edu/ogs/>) before enrolling in clinical, internship, practicum, off-campus directed study, co-op, or capstone courses in order to discuss proper documentation for these curriculum requirements (see also F-1 Curricular Practical Training (<https://international.northeastern.edu/ogs/employment/curricular-practical-training-cpt-f1/>)).
- Graduate international nursing students must have a current U.S. nursing license.

### Academic, Professional, or Research Misconduct

The healthcare professions represented by the programs in Bouvé College require more of their members than simple mastery of technical knowledge and skills. Equally important is the ability to earn the respect and confidence of those who seek medical care. The nearly universal existence of codes of conduct and standards of professional ethics and behavior in these disciplines is evidence that certain types of conduct are expected in order to promote this respect and confidence. Fundamental to most of these codes is an understanding that healthcare professions require individuals who conduct their activities in a manner that reflects a total concern for the well-being of the patient. Violations of ethical conduct may be grounds for dismissal from the program. Students are expected to learn and practice the conduct that is appropriate to their professions and promotes the physical and mental well-being of the patient.

Bouvé students are expected to adhere to the highest academic and professional standards. The university Code of Student Conduct (p. 160) sets forth the university's expectations of behavior that promotes the safety and welfare of the Northeastern community and defines various aspects of academic misconduct, such as cheating and plagiarism. Lack of knowledge of these definitions does not negate the student's responsibility for upholding them. Academic misconduct is regarded as a serious violation of ethical standards and may result in the student's immediate dismissal from the program.

Failure to meet these standards, including misconduct in academic, professional, or research activities, will result in disciplinary action. Such actions may include a lowered or failing grade in the course, probation, suspension, or immediate dismissal from the program. Students found responsible for academic, professional, or research misconduct will have a letter placed in their permanent file stating the pertinent findings of their case.

In addition to maintaining complete honesty in all academic work, students admitted to clinical or professional programs in the Bouvé College of Health Sciences are expected to familiarize themselves with the code of ethical conduct of the professional discipline they are entering and to agree to uphold these principles.

Similarly, students who participate in research programs are expected to familiarize themselves with the code of ethics in research. Such a code is outlined in Guidelines for the Conduct of (<https://oir.nih.gov/sourcebook/ethical-conduct/research-ethics/nih-guidelines/>) Research. Ethical codes of conduct for researchers are also presented in the National Academy of Sciences' (<https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in/>) On Being a Scientist, A Guide to Responsible Conduct in Research (<https://www.nap.edu/catalog/12192/on-being-a-scientist-a-guide-to-responsible-conduct-in/>). Violations of research ethics can include, but are not limited to, falsification or fabrication of data, plagiarism, malicious allegations of misconduct in science, covering up or failing to report misconduct, obstructing due process in investigations of misconduct, and reprisals against those revealing misconduct.

See also the "Scientific or Research Misconduct" section of the Academic Appeals Policies and Procedures (p. 185) page in this catalog.

***These policies and/or procedures apply to Bouvé's undergraduate and graduate students, unless specifically indicated otherwise in this section of the catalog.***

### Interdisciplinary Programs

#### Doctor of Medical Science (DMSc)

- Healthcare Leadership (p. 642)

#### Doctor of Philosophy (PhD)

- Network Science (p. 344)
- Personal Health Informatics (<https://catalog.northeastern.edu/graduate/computer-information-science/health-informatics/personal-health-informatics-phd/>)

#### Master of Science (MS)

- Complex Network Analysis
- Health Informatics (p. 652)
- Pharmaceutical Engineering (p. 433)
- Real-World Evidence in Healthcare and Life Sciences (p. 657)

- Statistics (p. 658)
- Statistics—Connect (p. 660)

## Dual Degree

- Law, JD/Public Health, MPH (p. 662)
- Pharmacy, PharmD (p. 662)—Direct Entry/Public Health, MPH (p. 662)
- Public Health, MPH/Health Informatics, MS (p. 662)

## Graduate Certificate

- AI Applications
- Early Intervention (p. 664)
- Health Informatics Management and Exchange (<https://catalog.northeastern.edu/graduate/health-sciences/interdisciplinary/health-informatics-management-exchange-graduate-certificate/>)
- Health Informatics Privacy and Security (<https://catalog.northeastern.edu/graduate/health-sciences/interdisciplinary/health-informatics-privacy-security-graduate-certificate/>)
- Health Informatics Software Engineering (p. 666)
- Patient Safety (p. 666)

## Healthcare Leadership, DMSc

Northeastern University's Doctor of Medical Science (DMSc) is an interdisciplinary degree designed for medical professionals to advance their education and expand their career opportunities in the areas of healthcare leadership, administration, informatics, law, safety, extreme medicine, exercise science, and advocacy. Students from diverse healthcare backgrounds share the common goal of developing facility with healthcare systems and becoming leaders within the greater healthcare community.

In addition to taking core courses in healthcare leadership, administration, and research methods, students will have the opportunity to obtain additional education in one of several areas of specialization. These concentrations are designed to empower graduates from diverse backgrounds with the technical and analytical expertise that is both relevant and in high demand in today's healthcare environment. Students will have the opportunity to collaborate with faculty not only from the Department of Medical Sciences but also with world-renowned faculty from a variety of interdisciplinary fields within Northeastern and the greater Boston community. This collaboration will allow students to access expertise and knowledge across disciplines that will culminate in the creation of an original thesis study.

Admission to the program requires a master's degree in a healthcare-related field or a bachelor's degree plus at least three years of full-time clinical experience.

This degree will take between 12 and 18 months to complete and can be fully completed online. Some concentrations have on-ground curriculum requirements.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Thesis topic approval

Thesis committee

Thesis proposal

Thesis defense

## Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
<b>Healthcare Leadership</b>		
MSCI 6001	Principles of Healthcare Advocacy	3
MSCI 6002	Workforce Metrics: Measuring, Comparing, and Privileging the Interprofessional Healthcare Team	3
MSCI 6003	Healthcare Leadership Seminar	3
PHTH 6204	Society, Behavior, and Health	3
<b>Research</b>		
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3
MSCI 6900	Research Methods and Design	3
MSCI 6901	Doctoral Writing Seminar	3
MSCI 7990	Thesis	3
Registration in the following course is required if the thesis is not completed by the conclusion of the term of registration for MSCI 7990:		
MSCI 7996	Thesis Continuation - Half-Time <sup>1</sup>	

## Concentrations

Completing a concentration is required to complete this program. A minimum of 12 semester hours is required.

- Business Management (p. 643)
- Exercise Science (p. 644)
- Extreme Medicine (p. 644)
- Health Informatics (p. 644)
- Health Informatics Research (p. 644)
- Health Law (p. 645)
- Interdisciplinary Healthcare Leadership (p. 645)
- Patient Safety (p. 646)
- Public Health (p. 646)

## Program Credit/GPA Requirements

Minimum of 36 total semester hours required

Minimum 3.000 GPA required

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### CONCENTRATION IN BUSINESS MANAGEMENT

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	12
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
HRMG 6318	Managing the Organization	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6318	Customer Value and the Enterprise	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	

**CONCENTRATION IN EXERCISE SCIENCE**

Code	Title	Hours
<b>Concentration Required<sup>2</sup></b>		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing <sup>3</sup>	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
<b>Selective</b>		
Complete 3 semester hours from the following:		
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	

**CONCENTRATION IN EXTREME MEDICINE**

Code	Title	Hours
<b>Complete a minimum of 12 semester hours.</b>		
<b>Concentration Required</b>		
MSCI 5403 and MSCI 5400		
	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 6</sup>	3
Complete a minimum of 6 semester hours from the following courses. Students may choose additional courses from the list below and/or an optional experiential elective to meet the minimum 12-semester-hour program requirement.		
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
<b>Optional Elective Experiential Courses<sup>5</sup></b>		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 6</sup>	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 5, 6</sup>	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 5, 6</sup>	

**CONCENTRATION IN HEALTH INFORMATICS**

Code	Title	Hours
<b>Concentration Required</b>		
HINF 5101		
	Introduction to Health Informatics and Health Information Systems	3
HINF 6220		
	Database Design, Access, Modeling, and Security	3
HINF 6400		
	Introduction to Health Data Analytics	3
<b>Selective</b>		
Complete 3 semester hours from the following:		
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	

**CONCENTRATION IN HEALTH INFORMATICS RESEARCH**

Code	Title	Hours
<b>Concentration Required</b>		
HINF 5101		
	Introduction to Health Informatics and Health Information Systems	3
HINF 6220		
	Database Design, Access, Modeling, and Security	3
HINF 6400		
	Introduction to Health Data Analytics	3
<b>Selective</b>		
Complete 4 semester hours from the following:		
CS 6350	Empirical Research Methods	
HINF 5300	Personal Health Interface Design and Development	

**CONCENTRATION IN HEALTH LAW**

Code	Title	Hours
<b>Concentration Required</b>		
LW 6102	Introduction to Legal Studies 2	3
<b>Selective</b>		
LW 6102 is a prerequisite for the LW courses listed below. Complete 9 semester hours from the following:		9
LW 6110	Law of Information and Records	
LW 6150	Law and Organizational Management	
LW 6180	Health Law Survey	
LW 6181	Healthcare Regulation and Compliance	
LW 6182	Patient Records, Privacy, and Security	

**CONCENTRATION IN INTERDISCIPLINARY HEALTHCARE LEADERSHIP**

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		12
<b>Business Management</b>		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6318	Customer Value and the Enterprise	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	
<b>Extreme Medicine</b>		
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
<b>Health Informatics</b>		
CS 6350	Empirical Research Methods	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6400	Introduction to Health Data Analytics	
<b>Health Law</b>		
HRM 6030	The Employment Contract	
LW 6102	Introduction to Legal Studies 2	
LW 6102 is a prerequisite for the following LW courses:		
LW 6110	Law of Information and Records	
LW 6150	Law and Organizational Management	
LW 6180	Health Law Survey	
LW 6181	Healthcare Regulation and Compliance	
LW 6182	Patient Records, Privacy, and Security	

**Pharmacy and Health Systems Science**

PHMD 5223	Evidence-Based Medicine
PHMD 5575	Pharmaceutical Industry
<b>Public Health</b>	
PHTH 5120	Race, Ethnicity, and Health in the United States
PHTH 5212	Public Health Administration and Policy
PHTH 6200	Principles and History of Urban Health
PHTH 6208	Urban Community Health Assessment

**CONCENTRATION IN PATIENT SAFETY**

Code	Title	Hours
<b>Concentration Required</b>		
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

**CONCENTRATION IN PUBLIC HEALTH**

Code	Title	Hours
<b>Concentration Required</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3

- 1 Students who have not completed their thesis but have already registered for the required number of thesis hours, and have no remaining coursework to complete the degree, may register for Thesis Continuation - Half-Time (MSCI 7996) in their last semester (including summer term). There is a 1-semester-hour tuition charge for Thesis Continuation - Half-Time (MSCI 7996). Thesis Continuation may be taken only once.
- 2 Anatomy and Physiology I and II or equivalent and an exercise physiology or medical background are strongly recommended for the Concentration in Exercise Science.
- 3 Physical Activity and Exercise: Prescription, Measurement, and Testing (EXSC 5210) is offered online with a four-day, on-campus, hands-on lab component in a low-residency format.
- 4 Courses are offered in partnership with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>)). Additional expenses may be associated with the experience courses. Offered on ground in a four-day experiential format.
- 5 Some of the optional experiential learning experiences are limited to specific groups of medical or allied health professionals.
- 6 One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experience course. Experiential Reflections: Bridging Theory and Experience (MSCI 5400) may be taken concurrently or after the associated courses.

**Network Science, PhD**

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing various fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This doctoral program trains students in network science across several colleges—the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. See other collaborating colleges' catalog sections for possible elective courses.

Coursework depends on a student's area of research and is subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 semester hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

**Annual Review**

A review of satisfactory progress will be ongoing and formally evaluated at the end of the program's first and second years. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

Each student will have a primary dissertation advisor from the network science doctoral program faculty. The dissertation advisor should be selected by the end of the program's second year's spring semester.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty.

## Alternate Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is mandatory for students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

## Qualifying Examination

The qualification exam is an oral examination of the material covered in the core curriculum. The exam will be an hour long and consist of questions selected by network science faculty. Students will receive between 50 to 80 questions to review for one month before the exam—a subset of which will make up the exam.

All students are required to sit for the exam in the fall, typically in their third year of the PhD program. Students who fail to pass the qualifying exam on their first attempt are expected to retake it in the spring term.

Students following the alternate path may take the exam at the end of the first academic year, upon completion of the required core courses.

Students may only take the qualifying exam twice.

## Dissertation Proposal

Students must submit a written dissertation proposal to the dissertation committee. The proposal should identify relevant literature, the research problem, plan, and the potential impact on the field. The proposal will be presented in an open forum before a public audience and the dissertation committee, followed by questions from noncommittee members. The written proposal must be given to committee members at least two weeks before the oral presentation. After the presentation, the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation. The comprehensive exam must precede the final dissertation defense by at least one year.

Students may repeat the comprehensive examination once if they are unsuccessful.

## Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## Dissertation Defense

A PhD student must complete and defend a dissertation involving original network science research. The dissertation defense must adhere to the dissertation policies of the College of Social Science and Humanities (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>).

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*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.*

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying exam  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

## Specializations

Complete 20 additional semester hours in one of the following specializations or another course of study with written approval from your advisor.

- Computer Science (p. 345)
- Epidemiology (p. 346)
- Math (p. 346)
- Physics/Theory (p. 346)
- Social Science (p. 346)
- Independent (p. 346)

### COMPUTER SCIENCE SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140	Machine Learning	4
or CS 6220	Data Mining Techniques	

### EPIDEMIOLOGY SPECIALIZATION

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

### MATH SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4

### PHYSICS/THEORY SPECIALIZATION

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7321	Computational Physics	4

### SOCIAL SCIENCE SPECIALIZATION

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4

### INDEPENDENT SPECIALIZATION

Code	Title	Hours
Students must choose two courses related to their research area with approval from their advisor.		6–8

## ELECTIVES LIST

Code	Title	Hours
Select from the list below to complete the remaining 12–14 semester hours for the coursework requirement. Courses outside this list may be approved by the student's advisor.		12–14
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	

MATH 7233	Graph Theory
MATH 7243	Machine Learning and Statistical Learning Theory 1
NETS 7341	Network Economics
NETS 7350	Bayesian and Network Statistics
NETS 7976	Directed Study
NETS 7983	Topics
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics

## Dissertation

Code	Title	Hours
<i>Precandidacy</i>		
NETS 8986	Research	
Students should register for NETS 8986 between completion of the qualification exam and proposal defense.		
<i>Dissertation</i>		
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	
<i>Dissertation Continuation</i>		
Following completion of NETS 9990 and 9991, registration in the following is required each semester until the dissertation is completed:		
NETS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Two specialization courses		8 NETS 7334	4
		One elective course	4
	12		12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
	8		8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
	0		0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
	0		0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
	0		0

Total Hours: 40

## Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
Two specialization courses		8 Two elective courses	8
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

Total Hours: 40

## Complex Network Analysis, MS

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4
NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4
NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

## Concentrations

Complete one of the following concentrations:

- Complex Social Systems (p. 651) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 652) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 652) (College of Science and Bouvé College of Health Sciences)

## Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	4
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

## Optional Co-op

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

## Program Credit/GPA Requirements

36–37 total semester hours required

Minimum 3.000 GPA required

## COMPLEX SOCIAL SYSTEMS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	6-8
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**ECONOMIC AND TECHNOLOGICAL NETWORKS**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		6-8
CS 7150	Deep Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		4-6
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**POPULATION HEALTH DYNAMICS CONCENTRATION**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		6-8
BINF 6308	Bioinformatics Computational Methods 1	
NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Complete 4–6 semester hours from the following:		4-6
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**Health Informatics, MS**

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students may opt to select a concentration to deepen their knowledge in a particular area. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

## Core Requirements

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
Choose one of the following courses in consultation with your advisor:		
HINF 5105 or HINF 5106	The American Healthcare System The Canadian Healthcare System	3

## Program Options

Choose one of the following options:

- Health Informatics (Without Concentration) (p. 653)
- Health Informatics with Health Informatics Analytics Concentration (p. 654)
- Health Informatics with Personal Health Informatics Concentration (p. 655)

## Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

### HEALTH INFORMATICS (WITHOUT CONCENTRATION)

Code	Title	Hours
<b>Required Coursework in Addition to Core Requirements</b>		
<b><i>Business Management</i></b>		
Complete two of the following:		
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215 or EMGT 5220	Project Management Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
<b><i>Health Informatics</i></b>		
Complete two of the following:		
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<b><i>Technical</i></b>		
Complete two of the following:		
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
HINF 6400	Introduction to Health Data Analytics	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6210	Applied Regression Analysis	
PHTH 6400	Principles of Population Health 1	
PHTH 6440	Advanced Methods in Biostatistics	

One course from the following may count toward the technical core requirement:

DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
<b>Capstone</b>		
HINF 7701	Health Informatics Capstone Project	3
<b>Electives</b>		
Complete two of the following:		6
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
HINF 6345	Design for Usability in Healthcare	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	

**HEALTH INFORMATICS ANALYTICS CONCENTRATION**

Code	Title	Hours
<b>Required Coursework in Addition to Core Requirements</b>		
<i>Business Management</i>		
Complete two of the following:		
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215 or EMGT 5220	Project Management Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
<i>Health Informatics</i>		
Complete two of the following:		
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<i>Technical</i>		
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
<b>Capstone</b>		
HINF 7701	Health Informatics Capstone Project	3
<b>Elective</b>		
Complete one of the following:		4
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7275	Data Mining in Engineering	

**PERSONAL HEALTH INFORMATICS CONCENTRATION**

Code	Title	Hours
<b>Required Coursework in Addition to Core Requirements</b>		
<i>Health Informatics</i>		
HINF 6205	Creation and Application of Medical Knowledge	3
<i>Technical</i>		
CS 5340	Computer/Human Interaction	4
Complete one of the following. Students must petition to take electives outside the approved list:		
CS 5010	Programming Design Paradigm	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 6200	Information Retrieval	
Complete one of the following:		
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
<i>Theory and Evaluation</i>		
PHTH 5210	Biostatistics in Public Health <sup>1</sup>	3
Complete one of the following:		
CS 6350	Empirical Research Methods (On campus only)	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
<i>Culminating Experience</i>		
Complete one of the two options below.		
<i>Thesis Option</i>		
Students must enroll in HINF 7990 for two semesters for a total of 6 semester hours with director approval only and under supervision of Personal Health Informatics faculty:		
HINF 7990	Thesis	
<i>Capstone Option</i>		
HINF 7701	Health Informatics Capstone Project	
Complete any course for a minimum of 3 semester from the Health Informatics (without concentration) curriculum, that has not been used in previous requirements.		

<sup>1</sup> Student may petition director to take a more advanced stats course, such as Applied Regression Analysis (PHTH 6210).

## Pharmaceutical Engineering, MS

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

### Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

## Restricted Elective Courses

Code	Title	Hours
At least 3 semester hours of total elective courses are required from pharmaceutical sciences (PHSC, PMST) and from chemical engineering (CHME). These semester hours could come from any elective group, as appropriate.		
<b>Regulatory</b>		
Complete 3 semester hours from the following:		3
BIOT 5340	Introduction to Biotherapeutic Approvals	
BIOT 5500	Concepts in Regulatory Science	
BIOT 6320	Design and Development of Biopharmaceuticals	
RGA 6002	Introduction to Regulatory Compliance and Practice	
<b>Quality/Statistics</b>		
Complete 4 semester hours from the following:		4
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
PHSC 6214	Experimental Design and Biostatistics	
<b>Depth Electives</b>		
Complete 7 semester hours from the following:		7
BIOT 5330	Drug Safety and Immunogenicity	
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 7250	Advanced Biotechnology Applications Laboratory	
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7350	Transport Phenomena	
PHSC 5300	Pharmaceutical Biochemistry	
PHSC 5310	Cellular Physiology	
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies	
PHSC 5555	Pharmaceutical Toxicology	
PHSC 5560	Nanotoxicity	
PHSC 5619	Mass Spectrometry in Drug Development	
PMST 6250	Advanced Physical Pharmacy	

PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

### Real-World Evidence in Healthcare and Life Sciences, MS

#### Overview

The Master of Science in Real-World Evidence (RWE) is an interdisciplinary, flexible, and contemporary degree that focuses on best practices for the appropriate acquisition and analysis of observational health data. Housed in the Department of Health Sciences and the Roux Institute, learners explore how observational research produces a comprehensive understanding of disease, including experience with appropriate methods and software to conduct this research.

RWE is the clinical evidence regarding the usage and potential benefits, or risks, of a medical product derived from analysis of real-world data (RWD). RWE can be generated by different study designs or analyses, including but not limited to randomized trials, pragmatic trials, and observational studies. RWD are the data relating to patient health status and/or the delivery of healthcare routinely collected from a variety of sources, for example, electronic health records, claims, and billing activities.

RWD and RWE are playing an increasing role in healthcare decisions. The FDA uses RWD and RWE to monitor postmarket safety and to make regulatory decisions. The healthcare community uses these data to support coverage decisions and to develop guidelines and decision support tools for clinical practice. Medical product developers use RWD and RWE to support clinical trial designs and observational studies to generate innovative, new treatment approaches.

This program is based on open, reproducible science—including the use of common data models and open-source analytics software to codify these practices into consistent, transparent, reproducible solutions—and applies these tools and practices to answer clinical questions by generating evidence to guide healthcare policy and improve patient outcomes.

The program seeks to educate two key professionals: analysts and researchers.

An analyst is a technician (e.g., solution architect, epidemiologist, data scientist, etc.) who is engaging in RWE studies by utilizing statistical tools and epidemiologic methods to operationalize and analyze RWD. Technicians may be carrying out activities on behalf of an institution or may be working as individuals interested in the technology that RWD offers. They may be involved in any stage of the RWD/RWE continuum (extract-transform-load [ETL]/data quality processes, tool enablement and self-service analytics, visualization, communication) and are often interested in extending these resources to serve additional use cases or new functionality.

A researcher is one who originates from any number of backgrounds (statistics, clinical training, public health, biological sciences, data science, etc.) who engages in the RWD community for the sake of designing and conducting a research study. Researchers want to know how to run their own observational research studies. In their day, researchers were often responsible for translating the science into better decisions and better care.

The intent of this program is to curate interdisciplinary expertise to support the evidence-generation process in the pharmacoepidemiology research community. The curriculum aims to ensure that learners can obtain in-demand skills that are immediately deployable in roles at pharmaceutical companies, regulatory authorities, health systems, technology companies, and consulting groups specializing in life sciences and healthcare.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

#### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
HSCI 5130	Introduction to Real-World Evidence	2
HSCI 5140	Foundations of Data Models	2
HSCI 5150	Methods for Observational Research 1	3
HSCI 5151	Methods for Observational Research 2	3
HSCI 5160	Standardization of Real-World Data	2
HSCI 5170	Data Model Transformation	2
PHSC 5212	Research Skills and Ethics	2
<b>Capstone Requirement</b>		
HSCI 6980	Real-World Evidence Capstone	3

## Selectives

Code	Title	Hours
Complete a minimum of 6 semester hours from the following:		6-12
HSCI 5180	Phenotyping	
HSCI 5190	Cohort Building	
HSCI 6110	Advanced Population Characterization	
HSCI 6120	Advanced Population Estimation	
HSCI 6130	Advanced Patient Prediction	

## Electives

Code	Title	Hours
Complete up to 6 semester hours from the following (electives are selected in consultation with the program director):		6
HINF 5300	Personal Health Interface Design and Development	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	

## Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

## Statistics, MS

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

### Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 659) (Bouvé College of Health Sciences)
- Statistical Machine Learning (p. 660) (Khoury College of Computer Sciences)
- Statistical Theory and Modeling (p. 660) (College of Science)

### Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		
MATH 6910	Master's Project	2
PHTH 6880	Statistical Consultancy	0

### Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	0
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	0

### Program Credit/GPA Requirements

31–32 total semester hours required

Minimum 3.000 GPA required

### BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	0
PHTH 6802	Causal Inference 2	0
PHTH 6810	Survival Analysis	0
PHTH 6820	Design and Analysis of Clinical Trials	0

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Statistics, MS—Connect**

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Connect Courses**

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		
CS 5001	Intensive Foundations of Computer Science	8-10
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	

MATH 5003	Accelerated Probability and Statistics
MATH 5110	Applied Linear Algebra and Matrix Analysis

## Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

## Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 661) (Bouvé College of Health Sciences (<http://northeastern.edu/bouve/>))
- Statistical Machine Learning (p. 662) (Khouri College of Computer Sciences (<https://khouri.northeastern.edu/>))
- Statistical Theory and Modeling (p. 662) (College of Science (<http://www.northeastern.edu/cos/>))

## Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		
MATH 6910	Master's Project	2
PHTH 6880	Statistical Consultancy	

## Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000 Professional Development for Co-op		
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	

## Program Credit/GPA Requirements

39-41 total semester hours required

Minimum 3.000 GPA required

## BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Law, JD / Public Health, MPH**

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See the JD/MPH program page (<https://law.northeastern.edu/academics/programs/jd/dual-degrees/public-health-bouve/>) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

**Pharmacy, PharmD—Direct Entry / Public Health, MPH**

The School of Pharmacy and Pharmaceutical Sciences and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy and Pharmaceutical Sciences PharmD—Direct Entry (p. 782) and Department of Health Sciences Master of Public Health (p. 710) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council of Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

**Public Health, MPH / Health Informatics, MS**

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mpf/>)

The Master of Public Health and Master of Science in Health Informatics dual degree allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH and MS degrees.

## AI Applications, Graduate Certificate

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- D'Amore-McKim School of Business
- Mills College at Northeastern

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

### Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		
EDUT 6150	AI in Education	4
HLTH 5800	AI Across the Health Sciences	4
IE 5640	Data Mining for Engineering Applications	4
JRNL 6460	AI in Media Industries	4
MISM 6250	Strategic AI for Business	4

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Early Intervention, Graduate Certificate

Northeastern University's Certificate Program in Early Intervention is an interdisciplinary, preservice training program that is designed to fulfill requirements for certification as an early intervention specialist, as set forth by the Massachusetts Department of Public Health.

The interdisciplinary nature of the program is facilitated by the interaction of graduate students from several disciplines (including school psychology, counseling psychology, and speech-language pathology); undergraduate students from majors such as speech-language pathology and audiology and psychology; and working professionals in the field. Personnel working in the field may use their worksites for field training.

The program is delivered in a fully online format. Classes meet synchronously one day each month, and additional course content is delivered online.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or doctoral degree programs. Application of coursework from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are:

- To prepare personnel to provide services to infants and toddlers with disabilities and their families from linguistically and culturally diverse backgrounds in urban environments
- To prepare personnel who have attained all competencies relative to early intervention, specified by the Massachusetts DPH, and that are consistent with best practice and research
- To prepare personnel in an interdisciplinary manner, drawing from Northeastern's multidisciplinary resources
- To prepare personnel to function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary teammates

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
<b>Required Core</b>		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3

### Optional Practicum

Completing the courses below provides eligibility to pursue provisional certification with advanced standing in the state of Massachusetts upon employment in an early intervention setting. Consult with your program director to determine eligibility for and availability of these course options.		
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SLPA 5154	Early Intervention Practicum 1
SLPA 5155	Early Intervention Practicum 2

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Health Informatics Management and Exchange, Graduate Certificate

### Overview

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

### Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

## Health Informatics Privacy and Security, Graduate Certificate

### Overview

The certificate program in health informatics privacy and security combines knowledge of health informatics with a strong foundation in important information security issues. Northeastern's status as a National Security Agency Center of Excellence for Information Security Education and Research ensures the program is both relevant and of high academic quality.

- Eight-month program
- Five courses, 18 semester hours

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Privacy and Security</b>		
CY 5130	Computer System Security	4
CY 5150	Network Security Practices	4
CY 5200	Security Risk Management and Assessment	4

## Program Credit/GPA Requirements

18 total semester hours required

Minimum 3.000 GPA required

## Health Informatics Software Engineering, Graduate Certificate

### Overview

This certificate program offers software engineers the background in health informatics (as well as interchange and interoperability standards) needed to better understand the context in which they work and perform effectively in a health-related organization. Program design is flexible to allow completion on a rapid schedule or a slower pace that is more compatible with full-time workers.

- Eight-month program
- Five courses, 15 semester hours

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6345	Design for Usability in Healthcare	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

## Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

## Patient Safety, Graduate Certificate

### Overview

The Graduate Certificate in Patient Safety informs and empowers the next generations of innovative patient safety experts by providing the knowledge and practical skills to promote a culture of safety and design safer systems of care. Future leaders incorporate clinician wellness strategies in

care delivery models that are accountable, honest, and transparent. The purpose of this certificate is to support healthcare clinicians and leaders in advancing patient safety and the safety of healthcare providers by expanding their fundamental skills and knowledge in patient safety science principles, workforce wellness, and quality improvement strategies.

This is a four-course, interdisciplinary graduate certificate, tailored to accommodate a busy healthcare professional's schedule. Courses are delivered in an online format, structured to enhance the curriculum with peer-to-peer discussions and experience developing tools, protocols, and process improvement strategies.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

A grade of B or higher is required in each course.

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.00 GPA required

### School of Clinical and Rehabilitation Sciences

**Trenton Honda, PhD, MMS, PA-C**

Associate Dean and Clinical Professor

617.373.3195

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Website (<https://bouve.northeastern.edu/csd/>)

**Emily Zimmerman, PhD, CCC-SLP**

Chair and Professor

Department of Communication Sciences and Disorders

617.373.5140

617.373.2239 (fax)

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Website (<https://bouve.northeastern.edu/physician-assistant/>)

**Carey Barry, MHS, PA-C, MT (ASCP), DFAAPA**

Chair and Associate Clinical Professor

Department of Medical Sciences

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Website (<https://bouve.northeastern.edu/physical-therapy/>)

**Darla M. Castelli, PhD**

Chair and Professor

Department of Physical Therapy, Movement, and Rehabilitation Sciences

**Eric Folmar, PT, DPT, OCS**

Associate Chair and Associate Clinical Professor

617.373.3508

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[PB\\_DPT\\_Inquiries@northeastern.edu](mailto:PB_DPT_Inquiries@northeastern.edu)

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The School of Clinical and Rehabilitation Sciences within the Bouvé College of Health Sciences at Northeastern University brings together the clinical fields of physical therapy (<https://bouve.northeastern.edu/physical-therapy/>), speech-language pathology and audiology (<https://bouve.northeastern.edu/csd/>), medical sciences, and physician assistant studies (<https://bouve.northeastern.edu/physician-assistant/>). Students and fellows in the school are prepared for clinical and research excellence, training with interdisciplinary experts in habilitation and rehabilitation sciences, epidemiology, neuroscience, engineering, physiology, exercise science, clinical medicine, design, diagnostic and therapeutic imaging, and communication. Working at the intersection of rehabilitation, clinical practice, data, and engineering, students and fellows engage in transformative research and experiential learning that is designed to prepare them to improve the quality of life and self-care for patients and communities, while promoting and developing innovative approaches to the future of healthcare.

## **Communication Sciences and Disorders**

Our mission is to advance the science of human communication and its disorders, understand the science of human communication untethered from traditional limitations of the field, and make a direct impact on the world through targeted learning experiences and research opportunities, while creating an inclusive community. Our faculty are researchers, practicing clinicians, and scientists who bring real-world experience into the classroom to facilitate bench-to-bedside application. They develop, use, and address technology that improves communication and health beyond traditional boundaries.

The Department of Communication Sciences and Disorders offers a five-year PlusOne advanced degree pathway (BS-MS in Speech-Language Pathology) and a two-year Master of Science in Speech-Language Pathology degree. Our goal is to educate students to the highest levels of professionalism, consistent with the American Speech-Language-Hearing Association and the Council on Academic Accreditation, Northeastern University accreditation standards, and Massachusetts licensure requirements. We provide an interprofessional and practice-oriented education in our urban university environment, which affords students clinical experiences with clients, patients, and families from a diverse population base. Students are prepared with academic coursework informed by the most current scientific knowledge and evidence-based clinical practice.

## **Master of Science (MS)**

- Speech-Language Pathology (p. 669)

## **Medical Sciences**

The mission of the Department of Medical Sciences is to educate and inspire diverse and interdisciplinary professionals to be leaders and innovators in medical science. We offer an interdisciplinary doctoral degree in healthcare leadership, a Master of Science in Physician Assistant Studies, and a graduate certificate in extreme medicine.

Our flagship program in PA studies was established in 1971 and has a long-standing history of, and expertise in, the education and training of PAs. The PA program is located in close proximity to Boston's major academic medical centers and was the first generalist PA training program in the nation to offer a master's degree in 1985. This rigorous, highly integrated curriculum offers our students the opportunity to obtain broad generalist training that is designed to prepare them for successful employment in all fields of clinical practice.

The Doctor of Medical Science in Healthcare Leadership is an interdisciplinary online degree for healthcare professionals from diverse backgrounds to advance their education and expand their career opportunities in the areas of healthcare leadership, entrepreneurship, medical education, and community engagement and advocacy.

The Graduate Certificate in Extreme Medicine is an online interprofessional program offered in collaboration with World Extreme Medicine. The program is designed to prepare healthcare professionals to provide medical services in austere conditions. The core didactic courses provide foundational instruction in human factors, crisis resource management, efficiency of highly skilled teams, and theory and ethics of care in humanitarian crises.

Our faculty members are practicing clinicians, researchers, and healthcare leaders who bring real-world experience to the classroom. Northeastern University's graduates are in high demand and are employed in positions across the United States and internationally. In addition to clinical practice, our graduates are employed in research, administration, education, and leadership.

### **Doctor of Medical Science (DMSc)**

- Healthcare Leadership (p. 642)

### **Master of Science (MS)**

- Physician Assistant (p. 676)

### **Graduate Certificate**

- Extreme Medicine (p. 688)

## **Physical Therapy, Movement, and Rehabilitation Sciences**

The mission of the Department of Physical Therapy, Movement, and Rehabilitation Sciences is to impact the health and well-being of the global community by developing leaders in our fields through interprofessional experiential education, translational research, and excellence in clinical practice. This aligns well with the mission and academic plans of Bouvé College of Health Sciences and Northeastern University. That is, the programs within the department enhance and extend students' learning through experiential education, interdisciplinary collaborations, interprofessional education, and research opportunities, making an impact across our global campus and beyond. Our faculty members are leaders in education, research, and practice. Students have the opportunity to work with faculty to conduct ongoing research in one of the many diverse Department of Physical Therapy, Movement, and Rehabilitation Sciences' research groups and laboratories, including Neuromotor Systems Laboratory, Laboratory for Locomotion Research, ReGame-XR Laboratory, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Neurophysiology Laboratory, Occupational Biomechanics and Ergonomics Laboratory, Teaching and Learning with Innovation Laboratory, the Programmable and Reconfigurable Soft Engineered Systems Lab, and the Center for Cognitive and Brain Health.

Our flagship program is the Doctor of Physical Therapy. It is one of the oldest programs within Bouvé with the first graduates in 1915. The 37-month program provides comprehensive and rigorous graduate-level courses with a unique and valuable cooperative education experience, a six-month paid work opportunity in a physical therapy setting. In addition, concentrations are available in sports performance and pediatric physical therapy.

The PhD in Human Movement and Rehabilitation Sciences prepares its graduates to conduct independent (original) basic, translational, and applied research to restore and maximize human functional capacity and well-being across the life span. The interdisciplinary program and its faculty emphasize core competencies in motor control and motor learning, movement measurement and analysis, knowledge translation theory, and the use of traditional and emerging technologies.

The new Master of Science in Human Movement and Rehabilitation Sciences at Northeastern prepares students through revolutionary breakthroughs about how our bodies can work better. This 12-month program focuses on innovative rehabilitation solutions through enhanced research and education on topics including, but not limited to, biomechanics, musculoskeletal disorders, control of movement, motor learning, health and well-being through movement and design, human-cybernetic system interactions, and neurorehabilitation of movement and function. We offer this master's as a PlusOne option with several other Northeastern departments, especially within the College of Engineering.

The Department of Physical Therapy, Movement, and Rehabilitation Sciences has partnered with Massachusetts General Hospital Sports Physical Therapy to offer a 13-month full-time clinical residency program for physical therapists interested in pursuing a career in sports physical therapy. This program advances the knowledge and clinical competency of sports physical therapists, as well as to foster a culture of continued learning and scientific inquiry while demonstrating a commitment to patients, students, and athletes at all levels.

### **Doctor of Philosophy (PhD)**

- Human Movement and Rehabilitation Sciences (p. 677)

### **Doctor of Physical Therapy (DPT)**

- Doctor of Physical Therapy—Postbaccalaureate Entry (p. 680)

### **Master of Science (MS)**

- Human Movement and Rehabilitation Sciences (p. 686)

## **Speech-Language Pathology, MS**

Adhering to the highest professional standards, the speech-language pathology graduate program seeks to prepare future speech-language pathologists for the rigors of clinical practice in educational and healthcare settings. Graduates of the program will influence society in profound ways—for example, enabling children with autism to communicate effectively, relieving adolescents' fears of speaking dysfluently in the classroom, and helping stroke survivors resume activities in which they had previously participated. The comprehensive program of study emphasizes teamwork and interdisciplinary approaches to complex service delivery issues. SLP graduate students acquire the knowledge and skills needed for a lifetime of professional achievement and social contribution.

## Milestone Requirement Options

Students choose either of the following options:

### COMPREHENSIVE EXAMINATION

Students must complete a comprehensive examination during the final year in the program in order to graduate. Students must have completed Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) or be currently enrolled in Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418) in order to be eligible to take the comprehensive examination. Students may submit a written request to the program director in order to take the comprehensive examination prior to enrolling in Speech-Language Pathology Advanced Clinical Practicum 4 (SLPA 6418).

### MASTER'S THESIS

Students who elect to complete a master's thesis will have the comprehensive examination requirement waived. Students with previous aural rehabilitation coursework may use 3 semester hours from the master's thesis to fulfill a graduate elective slot.

## Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework with content equivalent in the following courses with a minimum grade of C.

Code	Title	Hours
SLPA 1102	Language Development	
SLPA 1103	Anatomy and Physiology of Speech and Hearing Mechanism	
SLPA 1200	Phonetics	
SLPA 1203	Introduction to Audiology	
SLPA 1205	Speech and Hearing Science	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Comprehensive examination or master's thesis

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Disorders</b>		
SLPA 5201	Diagnostic Testing in Speech-Language Pathology	2
SLPA 6219	Aural Rehabilitation (or elective) <sup>1</sup>	3
SLPA 6303	Stuttering	3
SLPA 6304	Augmentative and Alternative Communication	3
SLPA 6305	Articulation and Phonology	3
SLPA 6307	Voice Disorders	3
SLPA 6308	Dysphagia	3
SLPA 6313	Counseling in Speech-Language Pathology	2
SLPA 6321	Motor Speech Disorders	3
SLPA 6339	Language Literacy in Practice	1
SLPA 6340	Language Disorders in Children 1	3
SLPA 6341	Language Disorders in Children 2	3

SLPA 6342	Speech-Language Disorders In Adults 1	3
SLPA 6343	Speech-Language Disorders in Adults 2	3
<b>Science</b>		
SLPA 5109	Neurology of Communication	3
SLPA 6300	Speech Science	2
<b>Research</b>		
SLPA 6211	Research and Evidence-Based Practice	3
SLPA 6420	Practical Statistics for Speech-Language Pathology	3
<b>Diversity, Equity, and Inclusion</b>		
SLPA 6329	Diversity, Equity, and Inclusion in Speech-Language Pathology	2
<b>Practicum</b>		
SLPA 6415	Speech-Language Pathology Advanced Clinical Practicum 1	3
SLPA 6416	Speech-Language Pathology Advanced Clinical Practicum 2	2
SLPA 6417	Speech-Language Pathology Advanced Clinical Practicum 3	2
SLPA 6418	Speech-Language Pathology Advanced Clinical Practicum 4	2

<sup>1</sup> Students with previous coursework in aural rehabilitation may replace SLPA 6219 with 3 semester hours from the elective course list.

## Elective

Code	Title	Hours
Students with previous aural rehabilitation coursework may complete 3 semester hours from the elective course list or select other course options in consultation with a faculty advisor.		
SLPA 6310	Speech-Language Pathology in Medical Settings	
SLPA 6320	Autism	
SLPA 6325	Accent Modification for Speech-Language Pathology	
SLPA 6332	Seminar in Communication Disorders	

## Optional Thesis

Code	Title	Hours
Complete 6 semester hours across two semesters with prior approval.		
SLPA 6990	Thesis	6

## Program Credit/GPA Requirements

60 total semester hours required (additional hours required for thesis option)

Minimum 3.000 GPA required

## Healthcare Leadership, DMSc

Northeastern University's Doctor of Medical Science (DMSc) is an interdisciplinary degree designed for medical professionals to advance their education and expand their career opportunities in the areas of healthcare leadership, administration, informatics, law, safety, extreme medicine, exercise science, and advocacy. Students from diverse healthcare backgrounds share the common goal of developing facility with healthcare systems and becoming leaders within the greater healthcare community.

In addition to taking core courses in healthcare leadership, administration, and research methods, students will have the opportunity to obtain additional education in one of several areas of specialization. These concentrations are designed to empower graduates from diverse backgrounds with the technical and analytical expertise that is both relevant and in high demand in today's healthcare environment. Students will have the opportunity to collaborate with faculty not only from the Department of Medical Sciences but also with world-renowned faculty from a variety of interdisciplinary fields within Northeastern and the greater Boston community. This collaboration will allow students to access expertise and knowledge across disciplines that will culminate in the creation of an original thesis study.

Admission to the program requires a master's degree in a healthcare-related field or a bachelor's degree plus at least three years of full-time clinical experience.

This degree will take between 12 and 18 months to complete and can be fully completed online. Some concentrations have on-ground curriculum requirements.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Thesis topic approval

Thesis committee

Thesis proposal

Thesis defense

### Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
<b>Healthcare Leadership</b>		
MSCI 6001	Principles of Healthcare Advocacy	3
MSCI 6002	Workforce Metrics: Measuring, Comparing, and Privileging the Interprofessional Healthcare Team	3
MSCI 6003	Healthcare Leadership Seminar	3
PHTH 6204	Society, Behavior, and Health	3
<b>Research</b>		
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3
MSCI 6900	Research Methods and Design	3
MSCI 6901	Doctoral Writing Seminar	3
MSCI 7990	Thesis	3
Registration in the following course is required if the thesis is not completed by the conclusion of the term of registration for MSCI 7990:		
MSCI 7996	Thesis Continuation - Half-Time <sup>1</sup>	

### Concentrations

Completing a concentration is required to complete this program. A minimum of 12 semester hours is required.

- Business Management (p. 643)
- Exercise Science (p. 644)
- Extreme Medicine (p. 644)
- Health Informatics (p. 644)
- Health Informatics Research (p. 644)
- Health Law (p. 645)
- Interdisciplinary Healthcare Leadership (p. 645)
- Patient Safety (p. 646)
- Public Health (p. 646)

### Program Credit/GPA Requirements

Minimum of 36 total semester hours required

Minimum 3.000 GPA required

**CONCENTRATION IN BUSINESS MANAGEMENT**

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	12
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
HRMG 6318	Managing the Organization	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6318	Customer Value and the Enterprise	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	

**CONCENTRATION IN EXERCISE SCIENCE**

Code	Title	Hours
<b>Concentration Required<sup>2</sup></b>		
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing <sup>3</sup>	3
EXSC 5220	Advanced Exercise Physiology	3
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	3
<b>Selective</b>		
Complete 3 semester hours from the following:		
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	

**CONCENTRATION IN EXTREME MEDICINE**

Code	Title	Hours
<b>Complete a minimum of 12 semester hours.</b>		
<b>Concentration Required</b>		
MSCI 5403 and MSCI 5400	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 6</sup>	3
Complete a minimum of 6 semester hours from the following courses. Students may choose additional courses from the list below and/or an optional experiential elective to meet the minimum 12-semester-hour program requirement.		
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
<b>Optional Elective Experiential Courses<sup>5</sup></b>		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 6</sup>	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 5, 6</sup>	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>4, 5, 6</sup>	

**CONCENTRATION IN HEALTH INFORMATICS**

Code	Title	Hours
<b>Concentration Required</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6400	Introduction to Health Data Analytics	3

**Selective**

Complete 3 semester hours from the following:

HINF 5407	Business Application of Decision Support in Healthcare	3
HINF 6205	Creation and Application of Medical Knowledge	

**CONCENTRATION IN HEALTH INFORMATICS RESEARCH**

Code	Title	Hours
<b>Concentration Required</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6400	Introduction to Health Data Analytics	3
<b>Selective</b>		
Complete 4 semester hours from the following:		
CS 6350	Empirical Research Methods	
HINF 5300	Personal Health Interface Design and Development	

**CONCENTRATION IN HEALTH LAW**

Code	Title	Hours
<b>Concentration Required</b>		
LW 6102	Introduction to Legal Studies 2	3
<b>Selective</b>		
LW 6102 is a prerequisite for the LW courses listed below. Complete 9 semester hours from the following:		
LW 6110	Law of Information and Records	
LW 6150	Law and Organizational Management	
LW 6180	Health Law Survey	
LW 6181	Healthcare Regulation and Compliance	
LW 6182	Patient Records, Privacy, and Security	

**CONCENTRATION IN INTERDISCIPLINARY HEALTHCARE LEADERSHIP**

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		
<b>Business Management</b>		
ACCT 6318	Analyzing Accounting Data for Strategic Decision Making	
BUSN 6402	Stakeholder Values and Societal Challenges in Business	
ENTR 6250	Lean Design and Development	
FINA 6318	Financial Management	
INNO 6225	Acquisitions, Alliances, and Growth	
INNO 6318	Innovation Driven Strategy	
MISM 6201	Database Management for Business	
MISM 6202	Foundations of Data Analysis for Business	
MISM 6210	Information Visuals and Dashboards for Business	
MISM 6212	Data Mining and Machine Learning for Business	
MKTG 6318	Customer Value and the Enterprise	
SCHM 6318	Managing Operations and the Supply Chain	
STRT 6318	Strategic Planning for the Future	
<b>Extreme Medicine</b>		
MSCI 5001	Human Factors and Situational Awareness	
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	
<b>Health Informatics</b>		
CS 6350	Empirical Research Methods	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5200	Theoretical Foundations in Personal Health Informatics	

HINF 5300	Personal Health Interface Design and Development
HINF 5407	Business Application of Decision Support in Healthcare
HINF 6205	Creation and Application of Medical Knowledge
HINF 6220	Database Design, Access, Modeling, and Security
HINF 6400	Introduction to Health Data Analytics

**Health Law**

HRM 6030	The Employment Contract
LW 6102	Introduction to Legal Studies 2

LW 6102 is a prerequisite for the following LW courses:

LW 6110	Law of Information and Records
LW 6150	Law and Organizational Management
LW 6180	Health Law Survey
LW 6181	Healthcare Regulation and Compliance
LW 6182	Patient Records, Privacy, and Security

**Pharmacy and Health Systems Science**

PHMD 5223	Evidence-Based Medicine
PHMD 5575	Pharmaceutical Industry

**Public Health**

PHTH 5120	Race, Ethnicity, and Health in the United States
PHTH 5212	Public Health Administration and Policy
PHTH 6200	Principles and History of Urban Health
PHTH 6208	Urban Community Health Assessment

**CONCENTRATION IN PATIENT SAFETY**

Code	Title	Hours
<b>Concentration Required</b>		
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

**CONCENTRATION IN PUBLIC HEALTH**

Code	Title	Hours
<b>Concentration Required</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3

- <sup>1</sup> Students who have not completed their thesis but have already registered for the required number of thesis hours, and have no remaining coursework to complete the degree, may register for Thesis Continuation - Half-Time (MSCI 7996) in their last semester (including summer term). There is a 1-semester-hour tuition charge for Thesis Continuation - Half-Time (MSCI 7996). Thesis Continuation may be taken only once.
- <sup>2</sup> Anatomy and Physiology I and II or equivalent and an exercise physiology or medical background are strongly recommended for the Concentration in Exercise Science.
- <sup>3</sup> Physical Activity and Exercise: Prescription, Measurement, and Testing (EXSC 5210) is offered online with a four-day, on-campus, hands-on lab component in a low-residency format.
- <sup>4</sup> Courses are offered in partnership with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>)). Additional expenses may be associated with the experience courses. Offered on ground in a four-day experiential format.
- <sup>5</sup> Some of the optional experiential learning experiences are limited to specific groups of medical or allied health professionals.
- <sup>6</sup> One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experience course. Experiential Reflections: Bridging Theory and Experience (MSCI 5400) may be taken concurrently or after the associated courses.

## Physician Assistant, MS

Physician assistants are healthcare providers who practice medicine with physician supervision. They are highly sought after members of the healthcare team who provide diagnostic and therapeutic patient care. The physician assistant studies program is a full-time, two-year graduate program that provides an opportunity to earn a Master of Science degree.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of C or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
PA 6208	Professional Issues for Physician Assistants	2
PA 6326	Aspects of Primary Care	4
PA 6327	Emergency Medicine and Critical Care	2
PA 6328	Aging and Rehabilitation Medicine	2
PA 6329	Healthcare Delivery	2
PA 6330	Research Design	2
<b>Anatomy and Physiology</b>		
PA 6200	Anatomy and Physiology 1	3
PA 6201	Anatomy and Physiology 2	3
<b>Diagnosis and Evaluation</b>		
PA 6203	Physical Diagnosis and Patient Evaluation 1	3
PA 6204	Physical Diagnosis and Patient Evaluation 2	3
PA 6209	Clinical Laboratory and Diagnostic Methods 1	3
PA 6210	Clinical Laboratory and Diagnostic Methods 2	1
<b>Pharmacology</b>		
PA 6205	Pharmacology 1	2
PA 6206	Pharmacology 2	2
<b>Principles</b>		
PA 6311	Principles of Medicine 1	4
PA 6312	Principles of Medicine 2	4
PA 6313	Principles of Medicine 3	4
PA 6320	Principles of Obstetrics and Gynecology	2
PA 6321	Principles of Surgery	2
PA 6322	Principles of Orthopedics	2
PA 6323	Clinical Neurology	2
PA 6324	Principles of Pediatrics	2
PA 6325	Principles of Psychiatry	2
<b>Clinical</b>		
PA 6400	Applied Clinical Study in Medicine	5
PA 6401	Applied Clinical Study in Ambulatory Medicine	5
PA 6402	Applied Clinical Study in Family Practice	5

PA 6403	Applied Clinical Study in Emergency Medicine	5
PA 6404	Applied Clinical Study in Women's Health	5
PA 6405	Applied Clinical Study in Pediatrics	5
PA 6406	Applied Clinical Study in Surgery	5
PA 6407	Applied Clinical Study in Mental Health	5
PA 6408	Applied Clinical Study Elective	5

## Program Credit/GPA Requirements

103 total semester hours required

Minimum 3.000 GPA required

### Human Movement and Rehabilitation Sciences, PhD

The Department of Physical Therapy, Movement, and Rehabilitation Sciences offers a PhD program in human movement and rehabilitation sciences. The PhD program seeks to prepare graduates to conduct independent (original) basic, translational, and applied research with the goal of creating new knowledge about neuromotor mechanisms and methods of restoring and maximizing human functional capacity and well-being across the life span. The program emphasizes core competencies in motor control and motor learning, movement measurement and analysis, knowledge translation theory, and the use of traditional and emerging technologies. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of research methodology, analyses, and skills, as well as specialization within specific areas of human movement and rehabilitation research.

The program showcases the unique faculty and research laboratories in human movement and rehabilitation sciences, as well as highly ranked programs in Bouvé College of Health Sciences, the College of Science, and the College of Engineering. Northeastern is dedicated to advancing the field of human movement and rehabilitation sciences and translating research from bench to clinic. Students benefit from our new research laboratories utilizing state-of-the-art movement and rehabilitation methods including virtual reality, ultrasound, neuroscience, neurophysiology, robotics, and movement measurement technologies.

### Advanced Entry

Based on a student's background in their preceding master's or clinical doctorate degree, core coursework and total hours for the advanced entry program may vary. The graduate program director will consider all the program requirements and applicants' previous experience when advising students on a plan of study. All students, whether entering from traditional or advanced PhD pathways, will complete the milestones as documented in the curriculum.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Milestones

All students, whether entering from traditional or advanced PhD pathways, will complete the following milestones:

- Annual review
- Qualifying exam
- Dissertation committee
- Dissertation proposal
- Dissertation defense

### Core Requirements

Code	Title	Hours
Seminar		
Students must enroll in the following course every semester until start of the dissertation phase of the program (the course is repeatable two times for 1 semester hour and four times for 0 semester hours):		
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	2

**Rehabilitation Science and Human Movement**

PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

**Electives**

Code	Title	Hours
Complete 19 semester hours from the list below chosen in consultation with a faculty advisor.		19
Some courses may require prerequisite coursework.		
BIOE 5235	Biomedical Imaging	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
CAEP 6326	Behavioral Concepts and Principles	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6500	Human Performance	
IE 7315	Human Factors Engineering	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 6221	Neurological Rehabilitation 2	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	

**Dissertation**

Code	Title	Hours
PT 9990	Dissertation Term 1	
PT 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Advanced Entry Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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**Milestones**

Annual review

Qualifying exam  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense

## Core Requirements

Based on a student's background in their preceding master's degree, core coursework and total hours for the advanced entry program may vary. The graduate program director will consider the following program requirements when advising students on a plan of study.

Code	Title	Hours
<b>Seminar</b>		
PT 7030	Interdisciplinary Seminar in Rehabilitation Science (Repeatable 2 times for 1 semester hour and 4 times for 0 semester hours)	2
<b>Rehabilitation Science and Human Movement</b>		
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

## Electives

Code	Title	Hours
Some courses may require a prerequisite course.		
BIOE 5235	Biomedical Imaging	
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
CAEP 6326	Behavioral Concepts and Principles	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
HLTH 5450	Healthcare Research	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6500	Human Performance	
IE 7315	Human Factors Engineering	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 5202	Introduction to Epidemiology	
PHTH 5210	Biostatistics in Public Health	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5321	Applications of Biomechanics in Human Function and Movement	
PT 6221	Neurological Rehabilitation 2	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	

## Dissertation

Code	Title	Hours
PT 9990	Dissertation Term 1	
PT 9991	Dissertation Term 2	

## GPA Requirement

A minimum 3.000 GPA required

## Physical Therapy, DPT—Postbaccalaureate Entry

**Pamela Donlan, PT, DPT, EdD, CLT-LANA**

Associate Clinical Professor and Interim DPT Program Director

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Our Postbaccalaureate Doctor of Physical Therapy (DPT) (<http://www.northeastern.edu/bouve/pt/programs/pbdpt.html>) program is designed for individuals who hold a minimum of a baccalaureate degree in any major other than physical therapy and have satisfied the prerequisite requirements. Over the course of three years, this rigorous curriculum provides didactic and experiential learning experiences, the cornerstone of our program. These experiences include cooperative education, simulated patient interactions, interprofessional education, human cadaver lab, engagement with consumer clients, service-learning, clinical research, and integrated and full-time clinical education experiences.

The DPT program recognizes that becoming a physical therapist is a developmental process that allows students the opportunity to take risks, reflect, learn from mistakes, and continue to grow to promote lifelong learning. We are committed to a process of actively engaged learning that occurs in the classroom, the research laboratory, the community, and clinical settings regionally and internationally. We strive to provide challenging and leading-edge academic content in an environment supportive of professional development. Our educational philosophy is based upon a strong foundation of biological, psychological, social, and clinical sciences; experiential learning; evidence-based practice; cultural agility and humanistic values; and ethical and professional expectations. This is supported by a commitment of promoting and improving the health of clients and society locally, nationally, and globally. Academic content is student-centered and delivered using both traditional and innovative teaching methods including, but not limited to, lectures, small group projects and discussions, multimedia presentations, expert panel discussions, human cadaver lab, problem-based approaches, case studies, faculty-led research, patient simulation, interprofessional education opportunities, virtual and online learning activities, and self-reflection. Experiential learning, a cornerstone of our curriculum, is embedded in academic course requirements including clinical education, cooperative education, service-learning, and capstone research projects. These experiences are intentional and align with the Bouvé College and Northeastern University.

We offer a direct guaranteed acceptance\* for Northeastern undergraduate students interested in continuing their studies in the DPT program. Undergraduate students interested in this pathway can work with their academic advisor to complete the required prerequisite coursework (<https://bouve.northeastern.edu/physical-therapy/programs/pbdpt/>). Students may also be able to participate in physical-therapy-related experiential **cooperative education** to gain experience prior to enrolling. Northeastern graduates are eligible for the Double Husky Scholarship when enrolling in the DPT program, which offers a 25% tuition discount.

Please visit our website (<https://bouve.northeastern.edu/physical-therapy/programs/pbdpt/>) to learn more or email [PB\\_DPT\\_INQUIRIES@northeastern.edu](mailto:PB_DPT_INQUIRIES@northeastern.edu) for more information.

\*For guaranteed acceptance, students must maintain a 3.200 cumulative and prerequisite science GPA; complete the required prerequisite coursework (<https://bouve.northeastern.edu/physical-therapy/programs/pbdpt/>); and submit a resumé, transcript, letter of reference, and personal statement.

The DPT program offers two concentrations with application process.

- A pediatric physical therapy concentration designed to enhance the entry-level physical therapy graduate's ability to engage in interprofessional, family centered services with children from infancy through young adulthood in a variety of settings.
- A sports performance concentration designed to prepare the physical therapist student to confidently pursue a sports physical therapy position working with athletes of all ages in a variety of settings. Students take additional coursework, focused on research and clinical rotations that expand upon the entry-level physical therapy curriculum.
- Both concentrations are beneficial for students who may wish to pursue clinical residency programs in the area of sports or pediatric physical therapy including the Massachusetts General Hospital/Northeastern University Sports Physical Therapy Residency Program.

### Emphasis on Experiential Learning

#### COOPERATIVE EDUCATION

Our DPT program provides students with six months of full-time experiential learning in addition to the required clinical education experiences necessary for licensure. Through cooperative education, the hallmark of Northeastern, students are able to integrate semesters of academic study with semesters of cooperative education experiences in hospitals and clinics throughout the country. Students may be employed as physical therapy co-ops or perform other health-related duties.

As a part of cooperative education experiences, students will be completing an Integrated Clinical Experience (ICE) during Co-op Work Experience (PT 6964). This experience will provide clinical experience integrated within the didactic portion of the DPT curriculum. Students will observe and/or participate in patient interview, examination, evaluation, intervention, communication, and documentation skills previously learned in the classroom and cooperative educational experiences. Students will have the opportunity to increase their exposure and familiarity in a clinical setting and develop

emerging competency in physical therapy skills. Students will demonstrate personal and professional growth and be able to identify learning needs for success on their future first full-time clinical experience.

#### **CLINICAL EDUCATION**

The curriculum also includes three rotations for a total of 36 weeks of full-time clinical education under the direct supervision of a licensed physical therapist. We are affiliated with world-class medical centers and clinical sites throughout the United States, providing students with access to master clinicians and clinical scholars. Every effort is made to accommodate individual circumstances, but students should be prepared to travel out of state for two of the three clinical placements. Availability of a car may be required, as most sites are not accessible by public transportation. All expenses associated with clinical education, including travel and housing, are the responsibility of the student.

#### **GLOBAL OUTREACH**

Students may participate in short cultural immersion experiences abroad whereby they engage in community service projects under the direction of a physical therapy faculty member or on physical therapy academic exchanges with partner academic institutions.

#### **SERVICE-LEARNING**

During the curriculum, students participate in service-learning opportunities in the local community in which they learn and apply skills and knowledge related to program objectives. These opportunities start during the first academic year and continue throughout the program in a variety of settings.

#### **STUDENT RESEARCH**

The Department of Physical Therapy, Movement, and Rehabilitation Sciences' research mission is to build the evidence for best practices to maintain and improve the health and well-being of local, national, and global community members. Students have the opportunity to work with faculty to conduct ongoing research in world-renowned medical centers and in one of the eight Department of Physical Therapy, Movement, and Rehabilitation Sciences' labs and centers, including Neuromotor Systems Lab, Laboratory for Locomotion Research, Movement Neuroscience Laboratory, Musculoskeletal Epidemiology and Biomechanics Laboratory, Occupational Biomechanics and Ergonomics Laboratory, Teaching and Learning Innovation Lab, Neuroscience Wet Lab, and the Center for Cognitive and Brain Health Program.

### **Progression in the DPT Program**

To progress in the program, students must maintain acceptable standards of academic performance as stated in the program requirements section, including successful completion of all didactic, integrated clinical education cooperative education and full-time clinical education experiences. Students must demonstrate appropriate skills and professional behaviors to progress in the program. Students must develop appropriate motor skills, professional behaviors, and emotional maturity as outlined in the essential functions. The program in physical therapy is accredited by the Commission on Accreditation in Physical Therapy Education of the American Physical Therapy Association.

Graduates of the DPT program are eligible to sit for the National Physical Therapy Examination in pursuit of licensure.

#### **PROFESSIONAL BEHAVIORS REQUIREMENT**

In order to promote professionalism in the classroom, local and global communities, and clinical settings, the physical therapy program requires the demonstration of professional behaviors in accordance with the professional behaviors policy. The purpose of professional behaviors procedures is to help remediate students who have been identified as having professional behavior issues in an academic, cooperative, or clinical education setting. Professional standards are outlined in the student manual and may include but are not limited to the APTA Code of Ethics for the Physical Therapist ([https://www.apta.org/uploadedFiles/APTAorg/About\\_Us/Policies/Ethics/CodeofEthics.pdf](https://www.apta.org/uploadedFiles/APTAorg/About_Us/Policies/Ethics/CodeofEthics.pdf)) and/or the APTA Guide for Professional Conduct ([http://www.apta.org/uploadedFiles/APTAorg/Practice\\_and\\_Patient\\_Care/Ethics/GuideforProfessionalConduct.pdf](http://www.apta.org/uploadedFiles/APTAorg/Practice_and_Patient_Care/Ethics/GuideforProfessionalConduct.pdf)).

Any faculty member who has a concern about a student's professional behavior will arrange to meet with the student to discuss the issue. If the faculty member has met with the student and there is satisfactory resolution of the unprofessional conduct, only a form for tracking purposes is needed.

The tracking form shall be kept on record in order to track these students while they are in the program. A request for committee reviews as indicated on the tracking form must occur under the following conditions:

- a. A faculty member has attempted to correct the behavior and it has not been corrected after meeting with the student and taking initial steps to improve the identified professional behavior issues.
- b. The incident is egregious.
- c. A second breach of professional standards has occurred.

#### **Full Professional Behaviors Violation Review Process**

- a. The chairperson of the PTMRS Academic Affairs Committee will send a letter to students about whom concerns have been raised and instruct each student to complete a Self-Assessment of Professional Behaviors. A meeting date will be set to discuss the concern. If the committee finds there is sufficient evidence to support a violation of the professional standards previously defined, one will be noted in the student's record.
- b. The AAC will develop an appropriate remediation plan in collaboration with the student and appropriate faculty.
- c. Depending on the situation, students may have the opportunity to improve professional behaviors.
- d. Any of the following may result in a dismissal from the program:

- i. A third breach of professional standards
- ii. A second offense of the same professional standard
- iii. An egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

If a student believes they have been erroneously, capriciously, or otherwise unfairly treated in the process or decision, they may appeal decisions made by the PTMRS AAC to the chair of PTMRS.

If the student has been suspected of cheating or in any way violating the Academic Code of Conduct, the student will be referred to the AAC as well as Office of Student Conduct and Conflict Resolution. Any concern regarding the student's professional behavior will be brought to the attention of the faculty as appropriate.

## **Doctor of Physical Therapy Program Goals**

### **STUDENT:**

1. Demonstrate effective written, verbal, technological, and nonverbal communication skills in all professional settings.
2. Demonstrate leadership and advocacy skills.
3. Demonstrate professional and social responsibility by participating in local, national, and/or global initiatives.

### **GRADUATE:**

1. Be clinically competent and culturally sensitive doctors of physical therapy who, guided by the APTA Core Values, excel in patient/client management.
2. Exhibit professionalism, commitment to lifelong learning, and use of evidence-based practice.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

A grade of C or higher is required in all courses.

Code	Title	Hours
<b>Foundations</b>		
PT 6330 and PT 6331	Functional Anatomy 1 and Lab for PT 6330	3
PT 6340 and PT 6341	Functional Anatomy 2 and Lab for PT 6340	5
PT 5101 and PT 5102	Foundations of Physical Therapy and Lab for PT 5101	4
PT 6350 and PT 6351	Foundations of PT Examination and Therapeutic Activities and Lab for PT 6350	5
<b>Core</b>		
PT 5160	Psychosocial Aspects of Healthcare	3
PT 6243	Health Education, Promotion, and Wellness	3
PT 6245	Seminar for PT 6243	1
PT 5140	Pathology	4
PT 5500	Pharmacology for Physical Therapy	2
PT 5503 and PT 5504	Cardiovascular and Pulmonary Management and Lab for PT 5503	5

PT 5515 and PT 5516	Integumentary Systems and Lab for PT 5515	3
PT 5138 and PT 5139	Neuroscience and Lab for PT 5138	5
PT 5150 and PT 5151	Motor Control, Development, and Learning and Lab for PT 5150	5
PT 5209 and PT 5210	Neurological Rehabilitation 1 and Lab for PT 5209	5
PT 6221 and PT 6222	Neurological Rehabilitation 2 and Lab for PT 6221	5
PT 6550	Pediatric Aspects of Life Span Management	3
PT 6555	Geriatric Aspects of Life Span Management	2
PT 6305 and PT 6306	Musculoskeletal Management I and Lab for PT 6305	5
PT 6405 and PT 6406	Musculoskeletal Management II and Lab for PT 6405	5
PT 6505 and PT 6506	Musculoskeletal Management 3 and Lab for PT 6505	4
PT 6600	Special Topics	2
PT 6520 and PT 6521	Prosthetic Management and Lab for PT 6520	2
PT 6251	Diagnostic Imaging	3
PT 6420	PT Administration and Management within the U.S. Healthcare System	4
PT 5226	Physical Therapy Professional Seminar 2	2
PT 5540	Clinical Integration 1: Evidence and Practice	2
PT 6250	Clinical Integration 2: Evidence and Practice	2
<b>Clinical</b>		
PT 6441	Clinical Education 1	6
PT 6442	Clinical Education 2	6
PT 6450	Clinical Education 3	8
<b>Research</b>		
PT 6510	Evidence-Based Practice and Research Design	3
PT 6511	Research Methods and Statistics in PT	2
PT 6512	DPT Capstone 1	1
PT 6513	DPT Capstone 2	2
<b>Co-op</b>		
PT 5111	Professional Development for Bouvé Graduate Co-op	1
PT 6964	Co-op Work Experience (taken two semesters)	0

### Optional Concentration

- Pediatric Physical Therapy (p. 683)
- Sports Performance (p. 684)

### Program Credit/GPA Requirements

123 total semester hours required (138–143 semester hours with optional concentration)

Minimum 3.000 GPA required

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### Concentration in Pediatric Physical Therapy

Code	Title	Hours
<b>Required</b>		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
PT 6512	DPT Capstone 1 <sup>1</sup>	1
PT 6513	DPT Capstone 2 <sup>1</sup>	2
PT 6550	Pediatric Aspects of Life Span Management	3

Complete one of the following:

PT 6442	Clinical Education 2
PT 6450	Clinical Education 3

## Concentration in Sports Performance

Code	Title	Hours
<b>Required</b>		
PT 5165	Sports Medicine: Managing the Injured Athlete	4
PT 6237	Advanced Special Topics in Physical Therapy <sup>2</sup>	2
PT 6512	DPT Capstone 1	1
PT 6513	DPT Capstone 2	2
Complete one of the following:		
PT 6442	Clinical Education 2	6-8
PT 6450	Clinical Education 3	

- <sup>1</sup> Pediatric physical therapy concentration students will be assigned a faculty with expertise in pediatric physical therapy. Pediatric-focused PT project proposals will be reviewed and approved by the director of the pediatric physical therapy concentration in line with current course requirements.
- <sup>2</sup> Sports performance concentration students will be assigned a faculty project in sports, orthopedic, and/or anatomy. PT project proposals will be reviewed and approved by the director of the sports performance concentration in line with current course requirements.

## Academic Progression Policies

### ACADEMIC STANDING

Students must maintain an overall grade-point average of #3.000 #or higher and successfully complete all professional courses (including cooperative education, integrated clinical education, and full time clinical education experiences) with a grade of C or better (or Satisfactory for experiential education experiences) to progress into the subsequent semester of professional courses.

### PROBATION IN THE PROFESSIONAL PHASE

Students in the professional phase of the program who fail any professional course or whose overall GPA drops below a 3.000 must request to the department's Academic Affairs Committee to be granted a semester of academic probation to remediate the deficiency by the semester deadline set by the PTMRS Academic Standing Committee in order to remain in the Doctor of Physical Therapy program. Failure to request probation in a timely manner will result in a student being dismissed from the program.

A DPT student may only be placed on academic probation for one semester at a time or until the failed course is offered again. A DPT student may only be placed on academic probation a maximum of twice during the entire professional phase of the program.

During probation, students must correct all deficiencies as specified in their respective signed probation plan during the applicable probationary period. Failure to remediate the deficiencies within the agreed-upon time will result in dismissal from the program. During the period of probation, the student must earn a semester GPA of 3.000 or better, or the student will be dismissed from the DPT program. Once the student has successfully completed their probation action plan, they should work with their academic advisor to be removed from probation.

The chair of the department's Academic Affairs Committee may grant a DPT student's request for probation without a formal meeting under the following circumstances:

- The student has not already reached their maximum two semesters of probation.
- The student is in good professional standing with the Professional Behaviors Committee in accordance with the professional behaviors policy.

### PROFESSIONAL BEHAVIORS REQUIREMENT

See Progression in the DPT Program located in the overview text.

### Academic Dismissal from Major

Students in the DPT program will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in a total of three professional courses, regardless of remediation. Within the physical therapy program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to remediate a prior deficiency outlined within the probation contract within the agreed-upon time frame.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain an overall GPA of 3.000 or higher during the professional phase of the DPT program. Students will be dismissed if they are not eligible for a probationary status.
- Physical therapy students will be permitted only two changes in year of DPT graduation. Any additional changes to year of graduation will result in the student being dismissed from the program.

- Students who do not adhere to the professional standards of the program are violating academic policy and will be dismissed if any of the following occurs:
  - A third breach of professional standards
  - A second offense of the same professional standard
  - Any egregious breach of a professional standard as outlined in the student manual and/or behaviors that may include but are not limited to violation of the APTA Code of Ethics for the Physical Therapist and/or the APTA Guide for Professional Conduct

### ***Appeal of Academic Standing***

Students may request, through their academic advisor, to appeal to the chair of the department's Academic Standing Committee to meet with the committee for an exception to the Academic Progression and Probation Policy for DPT program for extenuating or capricious circumstances as provided in the student's respective handbook.

### ***Essential Functions for Physical Therapy Students***

The DPT program at Northeastern University is a challenging and intense program, which places specific demands on a student enrolled in the program. The academic rigor of the program closely corresponds to intellectual and physical demands that a graduate will encounter as a practicing physical therapist. Northeastern's DPT program is designed to prepare students to enter the physical therapy profession as a generalist with the skills, knowledge, and ability to successfully perform all the required functions of an entry-level physical therapist. Essential functions are the aptitudes and abilities required of physical therapist students to successfully complete the curriculum of the DPT program and to perform the clinical skills of a physical therapist consistent with patient/client management as detailed in the Guide to Physical Therapy Practice.

The purpose of this document is to delineate the essential functions that are fundamental to the DPT program. Upon admission, students must be able to perform each of the essential functions outlined below during classroom, laboratory, and experiential education learning activities (including, but not limited to, participation in one-on-one interactions, small group discussion and presentation, large group lectures, service-learning, and patient encounters) in both academic, community, and clinical settings.

Students are also required to demonstrate good judgment, responsibility, integrity, sensitivity, and compassion, while simultaneously being able to accurately synthesize and apply knowledge in a timely and safe manner.

Students are required to perform the following essential functions of the DPT program:

#### ***Communication Functions***

1. Read, understand, and communicate information in written and spoken formats using the English language.
2. Interpret and respond to the verbal, nonverbal, and written communications of others in an appropriate, professional manner.

#### ***Affective Functions***

1. Establish, value, and continue to develop professional, respectful, empathetic relationships with individuals from all lifestyles, cultures, ages, socioeconomic backgrounds, and abilities.
2. Develop, value, and maintain effective working relationships with faculty, students, professional colleagues, peers, patients/clients, families, and the general public.
3. Meet externally imposed deadlines and time requirements.
4. React effectively in challenging situations with use of appropriate resources.
5. Demonstrate an ability to function effectively in complex, highly stimulating environments.
6. Demonstrate responsibility for self-directed assessment, reflection, and professional growth.
7. Demonstrate core values of honesty, integrity, and accountability for the consequences of one's own actions.
8. Demonstrate ethical behavior, proper judgement, and decision-making skills.

#### ***Cognitive Functions***

1. Demonstrate self-management skills including planning, organizing, time management, and adhering to legal/regulatory requirements.
2. Use a variety of sources, including reading material, lecture, discussion, observation, and physical examinations to:
  - a. Recall, interpret, extrapolate, and apply information
  - b. Measure, analyze, synthesize, and evaluate information
  - c. Gather and prioritize information needed to solve a problem
3. Respond appropriately to emerging problems and potentially hazardous situations by making timely judgments to react effectively and seek assistance when necessary.
4. Accept and apply constructive feedback.

#### ***Psychomotor Functions***

1. Possess physical strength, stamina, balance, movement, hand-eye coordination, and dexterity required to perform patient care tasks in a manner that does not compromise the safety of self or others.
2. Perform intermittent physical activity of the whole body throughout an 8- to 12-hour period.
3. Engage in complex, coordinated movements needed during a variety of activities including skills lab practice, manual techniques, patient examination, intervention, and guarding.

4. Utilize auditory, visual, and tactile senses to receive information from written, spoken, and nonverbal communication mechanisms; observation of human structures; postures and movements; and equipment and or technology.
5. Quickly and appropriately react to sudden or unexpected events or movements of others.

For further information and clarification please refer to the Post Baccalaureate Doctor of Physical Therapy (PBDPT) Student Handbook (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx>) and Clinical Education Student Manual (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Handbooks.aspx>).

## Human Movement and Rehabilitation Sciences, MS

A strong global need exists for interdisciplinary, innovative, and translational research and practice directed toward improving quality of life and participation of all people in our communities. To meet this need, we offer a novel Master of Science in Human Movement and Rehabilitation Sciences.

Human movement and rehabilitation sciences encompasses a broad range of topics including sports performance, functional assessments, occupational biomechanics and ergonomics, motor control and learning, neuroscience, musculoskeletal disorders, orthopedics, aging, assistive technology, injury prevention and rehabilitation, communication sciences, speech, and early development.

The objective of this program is to prepare graduates to assist in advancing basic, translational, and applied research, as well as practice in human movement and rehabilitation sciences. The program is based on the integration of core skills and concepts across the multiple disciplines that are associated with human movement and rehabilitation sciences, coupled with the acquisition of skills and tools, and specialization within specific areas and tracks.

The Master of Science in Human Movement and Rehabilitation Sciences program is housed in the Department of Physical Therapy, Movement, and Rehabilitation Sciences, offering excellent collaborative teaching and research programs across the departments and school of the Bouvé College of Health Sciences, the Khoury College of Computer Sciences, the College of Engineering, and the College of Science. The 12-month program requires 32 semester hours of required and elective courses, including 4 semester hours devoted to the capstone project.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
Seminar		
Students must enroll for two semesters for a total of 2 semester hours:		
PT 7030	Interdisciplinary Seminar in Rehabilitation Science	2
<b>Rehabilitation Science and Human Movement</b>		
PT 5321	Applications of Biomechanics in Human Function and Movement	4
PT 6230	Capstone Project: Human Movement and Rehabilitation Sciences	4
PT 7001	Core Concepts in Rehabilitation Science and Research	3
PT 7005	Experimental Design and Applied Statistics	4
PT 7020	Technologies in Movement and Rehabilitation Science	4

## Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Exercise Science (p. 687)
- Electives (p. 687)

## Program Credit/GPA Requirements

Minimum 32 total semester hours required

Minimum 3.000 GPA required

### **EXERCISE SCIENCE CONCENTRATION**

Code	Title	Hours
Complete 12 SH from the list below.		
EXSC 5200	Cardiopulmonary Physiology	12
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
EXSC 5240	Clinical Nutrition Applications in Health and Disease	
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	
EXSC 6400	Applied Research Methods	

### **ELECTIVES OPTION**

Code	Title	Hours
Complete 11 semester hours from the list below. Students must petition to take electives outside the approved list.		
Some courses may require prerequisite coursework.		
BIOE 5235	Biomedical Imaging	11
BIOE 5800	Systems, Signals, and Controls for Bioengineers	
BIOE 5810	Design of Biomedical Instrumentation	
BIOL 5601	Multidisciplinary Approaches in Motor Control	
CAEP 6326	Behavioral Concepts and Principles	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5210	Physical Activity and Exercise: Prescription, Measurement, and Testing	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
EXSC 5240	Clinical Nutrition Applications in Health and Disease	
EXSC 6202	Electrocardiography, Clinical Assessment, and Prescription	
EXSC 6400	Applied Research Methods	
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	
HLTH 5450	Healthcare Research	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6500	Human Performance	
IE 7315	Human Factors Engineering	
ME 5250	Robot Mechanics and Control	
ME 5659	Control Systems Engineering	
ME 5665	Musculoskeletal Biomechanics	
ME 7247	Advanced Control Engineering	
PHTH 5202	Introduction to Epidemiology	
PHTH 6202	Intermediate Epidemiology	
PHTH 6210	Applied Regression Analysis	
PHTH 6440	Advanced Methods in Biostatistics	
PT 5133	Kinesiology	
PT 5138	Neuroscience	
PT 5150	Motor Control, Development, and Learning	
PT 5209	Neurological Rehabilitation 1	
PT 5410	Functional Human Neuroanatomy	
PT 6221	Neurological Rehabilitation 2	
PT 7010	Measurement and Analysis of Human Movement and Bioinstrumentation	

## Extreme Medicine, Graduate Certificate

### Overview

The Graduate Certificate in Extreme Medicine is an interprofessional program designed to prepare healthcare professionals to provide medical services in austere conditions. The core didactic courses are delivered online and provide foundational instruction in human factors, crisis resource management, efficiency of highly skilled teams, and theory and ethics of care in humanitarian crises.

In addition to the online courses, students take one or more on-ground experiential courses offered in an executive format. Experiential courses enable students to complete intensive, hands-on training and apply the principles of extreme medicine. This program is offered in collaboration with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>))).

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Core Requirements

A grade of B– or higher is required in each of the following:

Code	Title	Hours
Complete a minimum of 6 semester hours from the following courses. Students may choose additional courses from the list below and/or an optional experiential elective to meet the minimum 12 SH program requirement.		
MSCI 5001	Human Factors and Situational Awareness	6-9
MSCI 5002	Crisis Resource Management and Case Studies	
MSCI 5003	Humanitarian Aid Practice and Principles	
MSCI 5004	Humanitarian and Disaster Response Ethics	
MSCI 5005	Care During Conflict	

### Experiential Coursework

Code	Title	Hours
<b>Required Experiential Courses</b>		
MSCI 5403 and MSCI 5400	Expedition and Wilderness Medicine Experience and Experiential Reflections: Bridging Theory and Experience	3
<b>Optional Experiential Electives</b>		
The following experiential courses are optional , but each requires one additional SH of MSCI 5400.		
MSCI 5401 and MSCI 5400	Human Factors and Situational Awareness Experience and Experiential Reflections: Bridging Theory and Experience <sup>1</sup>	
MSCI 5402 and MSCI 5400	Expedition and Cold Weather Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>1</sup>	
MSCI 5405 and MSCI 5400	Humanitarian Medicine Experience and Experiential Reflections: Bridging Theory and Experience <sup>1</sup>	

<sup>1</sup> Courses are offered in partnership with World Extreme Medicine (WEM (<https://worldextrememedicine.com/>))). Additional expenses may be associated with the experience courses.

One semester hour of Experiential Reflections: Bridging Theory and Experience (MSCI 5400) must be completed for each experiential course. Some optional experiential courses may be restricted to licensed or credentialed professionals or to students in the last two years of study in a medical or allied health professional program.

Offered on ground in a 4-day experiential format.

After completion of the 12 required semester hours, students are eligible to register for any of the remaining courses using Bouvé College's Special Student (<https://registrar.northeastern.edu/article/non-matriculated-registration/>) registration process.

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### School of Community Health and Behavioral Sciences

Website (<https://bouve.northeastern.edu/academics/school-of-community-health-and-behavioral-sciences/applied-psychology/>)

#### **Jonathan Zaff, PhD**

Professor and Chair

Department of Applied Psychology

617.373.2485

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Website (<https://bouve.northeastern.edu/health-sciences/>)

#### **Robert Leeman, PhD**

Professor and Chair

Department of Public Health and Health Sciences

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The School of Community Health and Behavioral Sciences offers students interdisciplinary education and research excellence—drawing on novel health technologies and data literacy to address society's most pressing public health issues.

Students in the school are prepared to be the next generation of innovators and thought leaders in the health professions and public health. They will have an opportunity to be empowered to affect real change by leveraging new and emerging technologies and data.

The school is designed to improve individuals, communities, and society through three pillars of excellence:

- Health technologies
- Public mental health
- Social and environmental determinants of health to achieve social justice

## Department of Applied Psychology

Graduate programs in the Department of Applied Psychology (including two doctoral programs accredited by the American Psychological Association) reflect Northeastern University's tradition of practice-oriented education with an ecological and multicultural focus. Faculty and students come from diverse ethnic and cultural backgrounds, providing an enriching learning experience. The department is a scientist-practitioner-based unit that generates new psychological knowledge through research, and the translation of research, to applications that promote mental and physical health across the life span.

The Bouvé College of Health Sciences emphasizes experiential and field-based learning, interdisciplinary and global knowledge, and integration of science and practice. The Department of Applied Psychology seeks to prepare students to become mental and behavioral health professionals in a variety of educational, government, community, organizational, and private settings. Our doctoral programs provide excellent educational opportunities for those interested in professional psychology with specialized training for future careers in academic or practice positions as licensed psychologists. Our students have an opportunity to acquire knowledge and competency needed for a lifetime of personal fulfillment and professional achievement.

## Doctor of Philosophy (PhD)

- Counseling Psychology (p. 690)
- School Psychology (p. 692)

## Certificate of Advanced Graduate Studies (CAGS)

- School Psychology (p. 694)

## **Master of Science (MS)**

- Applied Behavior Analysis (p. 695)
- Applied Educational Psychology (p. 698)
- Applied Psychology (p. 699)

## **Master of Science in Counseling Psychology (MSCP)**

- Counseling Psychology (p. 700)

## **Graduate Certificate**

- Early Intervention (p. 664)

## **Department of Public Health and Health Sciences**

The Department of Public Health and Health Sciences in the Bouvé College of Health Sciences at Northeastern University provides a unique, transdisciplinary setting that incorporates academics, research, and practice and seeks to prepare students for a wide range of career paths. We offer two bachelor's degrees in health sciences and public health and options for combined majors with the D'Amore-McKim School of Business, the College of Social Sciences and Humanities, the College of Science, the College of Engineering, and the Khoury College of Computer Sciences, in addition to minors in exercise science, public health, global health, and nutrition. We offer several graduate degrees: Master of Public Health, Master of Science in Health Informatics in collaboration with Khoury College of Computer Sciences, a combined master's in the two fields, and a Master of Science in Real-World Evidence in collaboration with Northeastern's Roux Institute, as well as combined graduate degrees with the School of Pharmacy and the School of Law. Our Master of Public Health program is offered part time, full time and as a one-year accelerated online program. At the doctoral level, we offer a PhD program in population health and, in cooperation with Khoury, a PhD degree in personal health informatics.

Our diverse faculty has expertise in the fields of biostatistics/data science, community and rural health, environmental health, epidemiology, global health, health promotion and education, health policy, health technology, mental health, and more. Students have the opportunity to work side by side with faculty in conducting cutting-edge research in these fields.

In line with Northeastern's commitment to interdisciplinary research and urban engagement, we teach and work closely with many other schools, centers, and institutes in the university, including the Institute for Health Equity and Social Justice Research; the Center for Community Health Education, Research and Service; the Social Science Environmental Health Research Institute; and the Center for Health Policy and Healthcare Research; as well as community agencies and neighborhood health centers in the local Boston area and beyond.

## **Doctor of Philosophy (PhD)**

- Personal Health Informatics (p. 387)
- Population Health (p. 707)

## **Master of Public Health (MPH)**

- Public Health (p. 710)
- Public Health—Accelerated (p. 712)

## **Master of Science (MS)**

- Complex Network Analysis (p. 650)
- Health Informatics (p. 652)
- Real-World Evidence in Healthcare and Life Sciences (p. 657)
- Statistics (p. 658)
- Statistics—Connect (p. 660)

## **Dual Degree**

- Law, JD/Public Health, MPH (p. 662)
- Pharmacy, PharmD (p. 662)—Direct Entry/Public Health, MPH
- Public Health, MPH/Health Informatics, MS (p. 662)

## **Graduate Certificates**

- AI Applications (p. 663)
- Health Informatics Management and Exchange (p. 665)
- Health Informatics Privacy and Security (p. 665)
- Health Informatics Software Engineering (p. 666)

## **Counseling Psychology, PhD**

The Doctor of Philosophy in Counseling Psychology program is accredited by the American Psychological Association (APA). It is designed to train the next generation of mental health professionals. The program offers doctoral education and training in psychology and seeks to prepare students

for entry-level practice in counseling psychology. Doctoral-level counseling psychologists conduct research, teach at the university level, supervise students and professionals, consult with community agencies, and provide clinical services to people across the developmental life span. Counseling psychologists also enhance the science of health promotion and health psychology and emphasize community-based interventions. It is the mission of the PhD in Counseling Psychology program to train multiculturally competent counseling psychologists who are clinically adept in multiple settings with a variety of psychological and health-related issues and who are able to conceptualize, conduct, and evaluate research across biological, cultural, and relational systems in numerous social contexts, such as families, schools, neighborhoods, and communities.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

#### Annual review

Four qualifying examinations completed in the first three years—research, ethics, assessment, and intervention

Research team during the first year (two consecutive semesters)

Dissertation committee

Dissertation proposal

Dissertation defense

### Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Basic</b>		
CAEP 6390	History and Systems of Psychology	3
CAEP 6394	Advanced Multicultural Psychology	3
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
<b>Fieldwork</b>		
Complete 8 semester hours from the following:		8
CAEP 7741	Advanced Practicum 1	
CAEP 7742	Advanced Practicum 2	
CAEP 7743	Advanced Practicum 3	
CAEP 7744	Advanced Practicum 4	
<b>Clinical</b>		
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6352	Personality Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 7710	Advanced Clinical Assessment	3
CAEP 7720	Advanced Clinical Interventions	3
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy	3
<b>Elective</b>		
Three semester hours can be chosen from any graduate level CAEP course or combination of graduate level CAEP courses outside of the PhD in Counseling Psychology program of study. Other electives may be chosen upon approval of the program director and faculty adviser.		3
<b>Professional</b>		
Complete 6 semester hours from the following:		6

CAEP 7701	Doctoral Seminar in Counseling Psychology (Repeatable 3 times for 1 credit and 3 times for 0 credits)	
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	
<b>Research</b>		
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7716	Advanced Research and Data Analyses 2	3
<b>Internship</b>		
Complete 3 semester hours. Prior to beginning internship consult with director, DCT, and/or the Doctoral Internship Seminar instructor.		3
CAEP 7798	Doctoral Internship	

## Dissertation

Code	Title	Hours
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

62 total semester hours required

Minimum 3.000 GPA required

## School Psychology, PhD

Northeastern University's Doctor of Philosophy in School Psychology program is accredited by the American Psychological Association and the National Association of School Psychologists. The program is designed to prepare the next generation of leaders in school psychology. The ecological perspective and scientist-practitioner training model provide the foundation for the program's educational goals. Students have an opportunity to learn how to conduct research, to use research to inform practice, and to contribute to the scientific foundation of professional practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Comprehensive examination  
Annual review  
Mentored research project  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Professional</b>		
CAEP 6365	Seminar in School Psychology	3
CAEP 7702	Scholarship, Teaching, and Leadership in Applied Psychology	3
CAEP 7732	Legal and Ethical Issues in Community and Educational Settings	3
<b>Basic</b>		

CAEP 6206	Learning Principles	3
CAEP 6218 or CAEP 6220	Infant, Child, and Adolescent Development Development Across the Life Span	3
CAEP 6390	History and Systems of Psychology	3
CAEP 7750	Biological Bases of Behavior	3
CAEP 7755	Cognitive and Affective Bases of Behavior	3
CAEP 7756	Social Psychology in an Organizational and Ecological Context	3
<i>Elective Course</i>		
Complete a total of 3 semester hours with faculty advisor's prior approval.		3
<b>Multicultural Competency</b>		
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6394	Advanced Multicultural Psychology	3
<b>Assessment and Intervention</b>		
<i>Coursework</i>		
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6345	Promoting Youth Academic Success in Schools	3
CAEP 6347	Behavior Management	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6353	Curriculum-Based Assessment and Data-Based Decision Making	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6401	Counseling Children and Adolescents in Schools	3
CAEP 6402	Promoting Social, Emotional, and Behavioral Success in Schools	3
<i>Practicum</i>		
CAEP 6400	Prepracticum in School Psychology	1
CAEP 6999	Practicum Continuation	0
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
<i>Fieldwork</i>		
Complete a minimum of 2 semester hours required per course, for a total of 8 semester hours:		
CAEP 7741	Advanced Practicum 1	2
CAEP 7742	Advanced Practicum 2	2
CAEP 7743	Advanced Practicum 3	2
CAEP 7744	Advanced Practicum 4	2
<i>Internship</i>		
Complete 3 semester hours. Prior to beginning internship consult with director, DCT, and/or the Doctoral Internship Seminar instructor.		3
CAEP 7798	Doctoral Internship	
<b>Research</b>		
CAEP 6202 or NRSG 7712	Research, Evaluation, and Data Analysis Quantitative Research Methods	3
CAEP 6328	Single-Case Research Design	3
CAEP 7703	Grant Writing in the Health Professions	3
CAEP 7711	Measurement: Advanced Psychometric Principles	3
CAEP 7712	Intermediate Statistical Data Analysis Techniques	3
CAEP 7716	Advanced Research and Data Analyses 2	3

**Dissertation**

Code	Title	Hours
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

97 total semester hours required

Minimum 3.000 GPA required

## **Advanced Entry Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Students who enter with a master's degree develop an individualized program of study with their advisor, which requires a minimum of 50 semester hours of credit.

Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Comprehensive examination  
Annual review  
Mentored research project  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### **Core Requirements**

A grade of B or higher is required in all course work.

Code	Title	Hours
	Complete 50 semester hours of approved course work. Consult your faculty advisor for acceptable courses.	50

### **Dissertation**

Code	Title	Hours
Complete the following (repeatable) course twice:		
CAEP 9990	Dissertation Term 1	
CAEP 9991	Dissertation Term 2	

### **Program Credit/GPA Requirements**

50 total semester hours required

Minimum 3.000 GPA required

## **School Psychology, CAGS**

Northeastern University's Certificate of Advanced Graduate Study in School Psychology is approved by the National Association of School Psychologists and the Massachusetts Department of Elementary and Secondary Education. The overarching purpose of the program is to develop highly competent school psychologists. Some students also choose to concentrate in applied behavior analysis or concurrently enroll in the Graduate Certificate in Early Intervention (p. 664). The option to concurrently enroll in early intervention training is designed to prepare school psychologists to work with infants and toddlers and their families in community and related agencies, on interdisciplinary teams, and on the transition to school. The applied behavior analysis concentration is designed to prepare school psychologists to address the learning and behavioral needs of children and adolescents with challenging behaviors in school, home, and community settings, including children with autism spectrum disorders.

Please see also the Master of Science in Applied Educational Psychology (p. 698) program.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

### **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Clinical/Applied</b>		
CAEP 6345	Promoting Youth Academic Success in Schools	3
CAEP 6347	Behavior Management	3
CAEP 6353	Curriculum-Based Assessment and Data-Based Decision Making	3
CAEP 6354	Social, Emotional, and Behavioral Assessment	3
CAEP 6401	Counseling Children and Adolescents in Schools	3
CAEP 6402	Promoting Social, Emotional, and Behavioral Success in Schools	3
Elective course (with faculty advisement) <sup>1</sup>		3
<b>Practicum</b>		
CAEP 8415	Practicum in School Psychology 1	2
CAEP 8416	Practicum in School Psychology 2	2
CAEP 6999	Practicum Continuation	0
<b>Internship</b>		
Complete 6 semester hours from the following:		6
CAEP 8501	Internship in School Psychology 1	
CAEP 8502	Internship in School Psychology 2	

<sup>1</sup> Courses taken to fulfill the optional concentration may be used to fulfill the elective requirement.

## Optional Concentration

### APPLIED BEHAVIOR ANALYSIS

Code	Title	Hours
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6329	Ethics for Behavior Analysts	3
CAEP 6336	Systematic Inquiry 1	3

### Optional Intensive Practicum

An intensive practicum is optional in this concentration. Consult your faculty advisor.

CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2
CAEP 8419	Intensive Practicum in Applied Behavior Analysis 3	2
CAEP 8421	Intensive Practicum in Applied Behavior Analysis 4	2

## Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

### Applied Behavior Analysis, MS

The Master of Science in Applied Behavior Analysis program is designed to equip graduates with the skills to provide effective, compassionate behavior analytic services to students and clients across the life span in a variety of settings. Students are provided with flexible options to meet coursework and supervised fieldwork requirements to be eligible to take the Board Certified Behavior Analyst (BCBA®) examination. Courses explore the principles and procedures of applied behavior analysis in-depth and address its scientific and philosophical underpinnings. With this background, successful graduates are prepared to address the most complex behavior problems and learning challenges.

## **Curriculum**

The program requires completion of a 30-semester-hours course sequence and offers an option to add on up to 4 semester-hours to accrue further supervision at Northeastern University. The required sequence includes eight core courses, two experiential learning courses, and two courses that will guide students through completion of a scholarly project.

Courses are delivered in online or hybrid formats, with the majority of work being able to be completed asynchronously. Specific courses also include optional or required in-person or synchronous remote meeting times.

### **EXPERIENTIAL LEARNING AND INTENSIVE PRACTICUM**

Required experiential learning courses Experiential Learning in Skill Acquisition (CAEP 8412) and Experiential Learning in Behavioral Supervision (CAEP 8413) and optional intensive practicum courses Intensive Practicum in Applied Behavior Analysis 1 (CAEP 8417) and Intensive Practicum in Applied Behavior Analysis 2 (CAEP 8418) are offered to give students practice engaging in behavior analytic activities. Additionally, students may elect to accrue their supervised fieldwork requirement toward BCBA® eligibility through these classes.

### **PROJECT-BASED COURSES**

During the final year of the program students will enroll in Systematic Inquiry in Behavior Analysis 1 (CAEP 7412) and Systematic Inquiry in Behavior Analysis 2 (CAEP 7413). This set of courses is designed for students to progressively complete a scholarly project. Students will be able to select the type of project. The outcome of the first semester will be a presented proposal, and a final written report will be the outcome of the second semester.

## **Programs of Study**

Students who follow either sample program of study, taking 6 semester hours per academic term, will complete the Master of Science in Applied Behavior Analysis in 20 months. Courses are offered during the fall, spring, and full summer semesters with each course being offered twice per year.

Alternative options to this program of study may include:

- Completing the program in four semesters (16 months)—this involves taking 9 semester hours for two semesters and 6 semester hours for two semesters.
- Completing the program in more than five semesters—this involves taking 3 semester hours for some or all of the semesters during the program.
- Enrolling in optional intensive practicum courses—this involves adding up to two additional courses to the program of study to accrue additional supervised fieldwork hours while enrolled in the program.

Students planning on changing their program of study must complete an Alternative Program of Study form and have it approved by their faculty advisor to avoid semesters where courses they need are not offered.

## **Policies and Procedures**

Please see Bouvé College of Health Sciences Academic Policies and Procedures (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/>). Program-specific policies follow below.

### **GRADING, ACADEMIC PROBATION, AND ACADEMIC DISMISSAL**

If a student earns a grade of B– or lower, they will be placed on academic probation. In order to return to nonprobationary status, the student must retake the course during the next semester in which it is offered and earn a B or better. Failure to do so or earning a B– or below in any remaining course will result in dismissal from the Master of Science in Applied Behavior Analysis program.

### **COURSE PROGRESSION**

Students are expected to register for at least one course per academic term. In order to take a semester off (including the full summer semester), students must contact their faculty advisor to inform them of the timeline and apply for a leave of absence. Students who do not apply for a leave of absence prior to skipping a semester may need to reapply when returning to their coursework.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Students must complete all core, experiential learning, and project-based courses to successfully complete the program.

### **Core Courses**

Students enrolled in the program should pass Behavioral Concepts and Principles (CAEP 6326) and Ethics for Behavior Analysts (CAEP 6329) prior to registering for other courses unless otherwise advised.

Code	Title	Hours
CAEP 6326	Behavioral Concepts and Principles	3
CAEP 6327	Behavior Assessment	3
CAEP 6328	Single-Case Research Design	3
CAEP 6329	Ethics for Behavior Analysts	3
CAEP 6341	Behavioral Interventions	3
CAEP 6342	Consultation, Supervision, and Management	3
CAEP 6343	Radical Behaviorism and Verbal Behavior	3
CAEP 6344	Experimental Analysis of Behavior	3

### Experiential Learning Course

Experiential learning courses require students to have a site at which they are able to complete behavior analytic projects. There are additional requirements for students wishing to accrue supervised fieldwork hours through these courses.

The semester prior to the onset of each of these classes, the director of supervision will connect with students to confirm arrangements of an adequate worksite to complete all required activities and meeting availability. It is the responsibility of the student to comply with all deadlines throughout this process, or they will not be permitted to enroll in the course.

A grade of Satisfactory (S) is required for each of these courses.

Code	Title	Hours
CAEP 8412	Experiential Learning in Skill Acquisition	2
CAEP 8413	Experiential Learning in Behavioral Supervision	2

### Project-Based Courses

The project-based courses are designed to be taken concurrently so that students are guided through completion of a scholarly project. Prior to enrolling in Systematic Inquiry in Behavior Analysis 1 (CAEP 7412), students will work with faculty to plan for their project.

Code	Title	Hours
CAEP 7412	Systematic Inquiry in Behavior Analysis 1	1
CAEP 7413	Systematic Inquiry in Behavior Analysis 2	1

### Optional Courses

Students may elect to take up to two intensive practicum courses to fulfill additional supervised fieldwork hours. In order to register for these classes, students must complete all preparation tasks the semester prior to enrollment.

These courses can be started during the student's second semester in the program. They cannot be taken at the same time as experiential learning courses Experiential Learning in Skill Acquisition (CAEP 8412) and Experiential Learning in Behavioral Supervision (CAEP 8413).

Contact the director of supervision for additional information and preparation tasks.

Code	Title	Hours
CAEP 8417	Intensive Practicum in Applied Behavior Analysis 1	2
CAEP 8418	Intensive Practicum in Applied Behavior Analysis 2	2

### Program Credit/GPA Requirements

30 total semester hours required

Grade of B or higher required in each course, unless otherwise indicated

Minimum 3.000 GPA required

### Plan of Study

#### Sample Program of Study—Fall Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
CAEP 6326	3	CAEP 6327	3	CAEP 6341	3
CAEP 6329	3	CAEP 6328	3	CAEP 6342	3
	6		6		6

<b>Year 2</b>					
Fall	Hours	Spring	Hours		
CAEP 6343		3 CAEP 6344		3	
CAEP 7412		1 CAEP 7413		1	
CAEP 8412		2 CAEP 8413		2	
	6		6		

Total Hours: 30

## Sample Program of Study—Spring Entry

<b>Year 1</b>					
		Spring	Hours	Summer Full Semester	Hours
		CAEP 6326		3 CAEP 6327	3
		CAEP 6329		3 CAEP 6328	3
			6		6

  

<b>Year 2</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
CAEP 6341		3 CAEP 6343		3 CAEP 6344	3
CAEP 6342		3 CAEP 7412		1 CAEP 7413	1
		CAEP 8412		2 CAEP 8413	2
	6		6		6

Total Hours: 30

## Applied Educational Psychology, MS

Within Northeastern University's MS in Applied Educational Psychology, students enroll in foundational courses in learning, human development, assessment, and diversity. Students also begin their practicum sequence with the pre-practicum, the purpose of which is to provide students with observational experiences and an early opportunity to learn about the school ecology. Following completion of the MS in Applied Educational Psychology, students in good academic standing will enter the CAGS in School Psychology program. Both the MS and CAGS are necessary to obtain licensure as a school psychologist.

Students who are interested in concurrently pursuing early intervention qualification should consider the Early Intervention Graduate Certificate (p. 664). Please see also the CAGS School Psychology (p. 694) program.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Clinical/Applied</b>		
CAEP 6201	Introduction to Assessment	3
CAEP 6350	Introduction to Cognitive Assessment	3
CAEP 6400	Prepracticum in School Psychology	1
<b>Foundations</b>		
CAEP 6202	Research, Evaluation, and Data Analysis (course being added as additional way to fulfill stats requirement)	3

or HLTH 5410	Introduction to Statistics in Health and Behavioral Science	
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6206	Learning Principles	3
CAEP 6218	Infant, Child, and Adolescent Development	3
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6328	Single-Case Research Design	3
CAEP 6360	Consultation and Program Evaluation	3
CAEP 6365	Seminar in School Psychology	3

## Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

### Applied Psychology, MS

The Master of Science in Applied Psychology program at Northeastern University is committed to providing evidence-based knowledge in applied psychology to students who seek entry into a PhD in Counseling Psychology program and to graduates of baccalaureate degrees in human services, psychology, health sciences, and related disciplines who desire quality advanced training in applied psychology. The program is 30 semester hours and is intended to be completed in two semesters. It does not meet licensing regulations for mental health counselors in the Commonwealth of Massachusetts.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
CAEP 5877	Research Methods in Applied Psychology	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6260	Community Counseling Psychology	3
CAEP 6282	Ethics and Professional Development	3
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	3

## Concentration or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Child, Adolescent, and Family Psychology (p. 699)
- Prevention Science (p. 700)
- Electives (p. 700)

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

### CHILD, ADOLESCENT, AND FAMILY PSYCHOLOGY CONCENTRATION

Code	Title	Hours
Complete five of the following:		
CAEP 5150	Early Intervention: Family Systems	15

CAEP 5878	Pediatric Psychology
CAEP 5879	Trauma and Mental Health
CAEP 6218	Infant, Child, and Adolescent Development
CAEP 6222	Human Sexuality
CAEP 6247	Child and Adolescent Psychopathology

**PREVENTION SCIENCE CONCENTRATION**

Code	Title	Hours
Complete five of the following:		
CAEP 6100	Prevention and Intervention: Evidence-Based Practices	15
CAEP 6110	Etiology-Psychopathology Across the Life Span	
CAEP 6220	Development Across the Life Span	
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	
CAEP 6342	Consultation, Supervision, and Management	
CAEP 6346	Individual Behavior for Lasting Change	
PHTH 5540	Health Education and Program Planning	
PHTH 6204	Society, Behavior, and Health	

**ELECTIVES OPTION**

Electives not on this list may be chosen with faculty advisor approval.

Code	Title	Hours
Complete five of the following:		
CAEP 5150	Early Intervention: Family Systems	15
CAEP 5878	Pediatric Psychology	
CAEP 5879	Trauma and Mental Health	
CAEP 6100	Prevention and Intervention: Evidence-Based Practices	
CAEP 6110	Etiology-Psychopathology Across the Life Span	
CAEP 6218	Infant, Child, and Adolescent Development	
CAEP 6220	Development Across the Life Span	
CAEP 6222	Human Sexuality	
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	
CAEP 6247	Child and Adolescent Psychopathology	
CAEP 6342	Consultation, Supervision, and Management	
CAEP 6346	Individual Behavior for Lasting Change	
PHTH 5540	Health Education and Program Planning	
PHTH 6204	Society, Behavior, and Health	

**Counseling Psychology, MSCP**

The Master of Science in Counseling Psychology program at Northeastern University is committed to the development of competent Licensed Mental Health Counselors (LMHC) through the disciplinary studies and contemporary professional practice of counseling psychology. The program complies with licensing regulations for mental health counselors in the Commonwealth of Massachusetts and is unique in its offer of a choice of specific specializations to gain additional depth in selected areas within the general Master of Science program.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

The MSCP program requires a grade of B or better in all courses. Practicum and internship courses require a grade of Satisfactory (S). Grades of B– and lower or Unsatisfactory (U) are inconsistent with this policy. If received, students will be required to pay for the course again, repeat the course, and earn a grade of B or better or a grade of Satisfactory (S) in clinical practice courses.

## Core Requirements

Code	Title	Hours
<b>Seminar</b>		
CAEP 6380	Seminar in Feminist Psychology	3
<b>Required Core</b>		
CAEP 6200	Introduction to Counseling: Theory and Process in an Ecological Context	3
CAEP 6201	Introduction to Assessment	3
CAEP 6203	Understanding Culture and Diversity	3
CAEP 6220	Development Across the Life Span	3
CAEP 6235	Vocational, Education, and Career Development	3
CAEP 6242	Psychopathology: Diagnosis and Treatment Planning	3
CAEP 6250	Individual Interventions	3
CAEP 6260	Community Counseling Psychology	3
CAEP 6282	Ethics and Professional Development	3
CAEP 6287	Group Counseling	3
CAEP 6375	Substance Use and Treatment	3
CAEP 6399	Clinical Skills in Counseling Psychology	3
<b>Research</b>		
CAEP 6202	Research, Evaluation, and Data Analysis	3
<b>Practicum</b>		
CAEP 8401	Practicum in Counseling Psychology <sup>1</sup>	3
<b>Internship</b>		
CAEP 8510	Internship in Counseling Psychology 1	3
CAEP 8511	Internship in Counseling Psychology 2	3

<sup>1</sup> If a student enrolls in Practicum in Counseling Psychology (CAEP 8401) two times, the student may only choose 6 semester hours for electives. In rare cases where the student has chosen a *concentration and enrolls in CAEP 8401 two times*, the successful completion of Practicum in Counseling Psychology (CAEP 8401) for the second time takes priority. The student then must either forgo the concentration to complete the program with 60 semester hours or may choose to enroll in an additional course to complete the program plus concentration for a total of 63 semester hours.

## Concentrations or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Child and Adolescent Counseling Concentration (p. 701)
- Early Intervention Concentration (p. 702)
- Research in Counseling Psychology Concentration (p. 702)
- Electives (p. 702)

## Program Credit/GPA Requirements

A minimum of 60 total semester hours is required

Minimum 3.000 GPA required

### CHILD AND ADOLESCENT COUNSELING CONCENTRATION

Code	Title	Hours
CAEP 6247	Child and Adolescent Psychopathology	3
CAEP 6401	Counseling Children and Adolescents in Schools	3
Complete one of the following:		
CAEP 6218	Infant, Child, and Adolescent Development	3

CAEP 6402	Promoting Social, Emotional, and Behavioral Success in Schools
CAEP 6286	Family Counseling Interventions

**EARLY INTERVENTION CONCENTRATION**

Students who would like to earn a certification in early intervention must complete two semesters of internship at an early intervention site.

Code	Title	Hours
Complete 9 semester hours from the following:		
CAEP 5150	Early Intervention: Family Systems	9
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	
CAEP 5153	Early Intervention: Assessment and Intervention	
CAEP 6218	Infant, Child, and Adolescent Development	
SLPA 5152	Early Intervention: Planning and Evaluating Services	

**RESEARCH IN COUNSELING PSYCHOLOGY CONCENTRATION**

Code	Title	Hours
Complete 9 semester hours from the following:		
CAEP 6328	Single-Case Research Design	9
CAEP 7711	Measurement: Advanced Psychometric Principles	
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CAEP 7716	Advanced Research and Data Analyses 2	
CAEP 7771	Research Team Experience	
HLTH 5410	Introduction to Statistics in Health and Behavioral Science	
PHTH 6320	Qualitative Methods in Health and Illness	

**ELECTIVES OPTION**

When students are required to complete Practicum in Counseling Psychology (CAEP 8401) two times, students may only choose 6 semester hours as electives. Electives not on this list may be chosen with faculty advisor approval.

Code	Title	Hours
Complete 9 semester hours from the following:		
CAEP 6218	Infant, Child, and Adolescent Development	9
CAEP 6222	Human Sexuality	
CAEP 6247	Child and Adolescent Psychopathology	
CAEP 6283	Brief Therapies	
CAEP 6286	Family Counseling Interventions	
CAEP 6390	History and Systems of Psychology	
CAEP 6394	Advanced Multicultural Psychology	
CAEP 7720	Advanced Clinical Interventions	
CAEP 7758	Doctoral Seminar in Contemporary Theories of Psychotherapy	
PHTH 6320	Qualitative Methods in Health and Illness	

**Early Intervention, Graduate Certificate**

Northeastern University's Certificate Program in Early Intervention is an interdisciplinary, preservice training program that is designed to fulfill requirements for certification as an early intervention specialist, as set forth by the Massachusetts Department of Public Health.

The interdisciplinary nature of the program is facilitated by the interaction of graduate students from several disciplines (including school psychology, counseling psychology, and speech-language pathology); undergraduate students from majors such as speech-language pathology and audiology and psychology; and working professionals in the field. Personnel working in the field may use their worksites for field training.

The program is delivered in a fully online format. Classes meet synchronously one day each month, and additional course content is delivered online.

This graduate certificate program can be completed by non-degree-seeking students or integrated with master's or doctoral degree programs. Application of coursework from certain degree programs will be approved to apply to requirements of this graduate certificate; students are encouraged to speak with their academic advisors early in their programs to explore these options.

The goals for the early intervention certificate program are:

- To prepare personnel to provide services to infants and toddlers with disabilities and their families from linguistically and culturally diverse backgrounds in urban environments
- To prepare personnel who have attained all competencies relative to early intervention, specified by the Massachusetts DPH, and that are consistent with best practice and research
- To prepare personnel in an interdisciplinary manner, drawing from Northeastern's multidisciplinary resources
- To prepare personnel to function effectively across teams (individualized family service plan teams, community teams, interagency teams) and to understand the roles of their interdisciplinary teammates

Upon graduation, students are eligible for employment in an early intervention service delivery setting.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in all courses.

Code	Title	Hours
<b>Required Core</b>		
CAEP 5150	Early Intervention: Family Systems	3
CAEP 5151	Early Intervention: Infant and Toddler Development, Risk, and Disability	3
CAEP 5153	Early Intervention: Assessment and Intervention	3
SLPA 5152	Early Intervention: Planning and Evaluating Services	3

### Optional Practicum

Completing the courses below provides eligibility to pursue provisional certification with advanced standing in the state of Massachusetts upon employment in an early intervention setting. Consult with your program director to determine eligibility for and availability of these course options.

SLPA 5154	Early Intervention Practicum 1
SLPA 5155	Early Intervention Practicum 2

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Personal Health Informatics, PhD

Northeastern University's Doctor of Philosophy in Personal Health Informatics is a transdisciplinary doctoral program focused on educating top researchers in the theoretical underpinnings, design, evaluation, and dissemination of consumer- and patient-focused health systems. Personal health technologies are those that non-health professionals interact with *directly*, both in and out of a clinical setting and in various life stages of illness and wellness.

Examples include:

- Assistive technologies that aid persons with disabilities
- Consumer wellness promotion technologies
- Patient education and counseling systems
- Interfaces for reviewing personal health records
- Advanced ambulatory monitoring for supporting health

- Automated elder care systems that monitor health and support independent living
- Social networking systems connecting families and their social and medical support networks

Developing personal health interface technologies requires that professionals have skills and experience designing systems for individual patients and consumers with a wide range of backgrounds in different contexts using a variety of media, while ensuring that fielded technologies are effective, reliable, and responsive to the needs of at-risk and patient populations. Critical skills and knowledge include needs assessment, theories of interface design and health behavior, rapid prototyping and implementation, experimental design with human subjects in challenging settings, and statistical data analysis and validation. Moreover, these skills must be deployed while working with, or leading, transdisciplinary teams.

The interdisciplinary nature of the program targets students who are interested in improving health and wellness using novel technologies that directly impact the lives of consumers and patients. This is a program for students who are not only technically strong but also socially conscious, design oriented, and interested in rigorously evaluating the technologies they imagine and build. The program provides a path for technical students to acquire more experience in the deployment and evaluation of health technologies in the field but also a path for students with health backgrounds to develop the technical skills needed to prototype and assess creative ideas they envision for improving care. The expected length of study is five years after the bachelor's degree.

## **Admission Requirements**

Students will be accepted with either of the following:

- A bachelor's or higher degree in a technical discipline (e.g., computer science or information science, computer systems engineering) with either academic or work experience demonstrating a commitment to working in health.
- A bachelor's or higher degree in a health science discipline (e.g., nursing, medicine, physical therapy, pharmacy, public health) with either some academic coursework in technology, such as a course in programming or design, or work experience where the applicant participated in the development, adaptation, or evaluation of consumer- or patient-facing health technology. (Otherwise outstanding applicants without programming skills may be advised to take an introductory programming course prior to entry; otherwise outstanding applicants without any formal experience working in health settings may be advised to spend some time volunteering in a medical or community health setting prior to entry.)

Applicants will be expected to have:

- A minimum 3.000 undergraduate GPA
- A minimum total GRE score of 300 or equivalent
- A minimum GRE academic writing score of 3.5
- For international applicants, a minimum TOEFL score of 105

## **Minimum Academic Standards and Requirements**

### **RESIDENCY REQUIREMENT**

The residency requirement will follow the university's residency requirement for PhD programs (<https://catalog.northeastern.edu/graduate/general-admission-transfer-credit/regulations-phd-programs/>).

### **TEACHING REQUIREMENT**

All personal health informatics PhD students must satisfy the teaching requirement in order to graduate. This requirement is fulfilled when the student works as a teaching assistant or instructor of record for one semester and during this semester:

- Teaches at least three hours of classes
- Prepares at least one assignment, or quiz, or equivalent

PhD students are expected to satisfy the teaching requirement some time after completing their first year and at least one semester prior to scheduling their PhD defense.

### **DISSERTATION ADVISING**

Each student will have one primary advisor from the personal health informatics doctoral program faculty.

### **DISSERTATION COMMITTEE**

The committee will consist of at least three members: the dissertation advisor, one additional personal health informatics doctoral program faculty member, and one member external to Northeastern who is an expert in the specific personal health informatics topic of research. The dissertation committee shall include experts with both health and technology backgrounds. The dissertation advisor must be a full-time member of the Northeastern faculty.

### **QUALIFYING EXAMINATION**

The qualifying examination consists of a three-part exam conducted by a committee of three personal health informatics doctoral program faculty members, each overseeing one part of the exam. The research core of the exam is fulfilled with submission of a high-quality paper to a strong peer-reviewed conference or journal. The health component of the exam is fulfilled when the student passes a written exam developed by a faculty member with a health sciences background, and the technical component of the exam is fulfilled when the student passes an exam developed by a faculty member with a technical background. The content of the written exams and the paper topic are developed in consultation with each faculty member.

## DEGREE CANDIDACY

A student is considered a PhD degree candidate upon meeting these conditions:

- Completion of core courses with a minimum GPA of 3.000 overall on the core courses
- Completion of the qualifying examination

## COMPREHENSIVE EXAM

A PhD student must submit a written dissertation proposal to the dissertation committee. The proposal should identify the research problem, the research plan, and its potential impact on the field. A presentation of the proposal will be made in an open forum, and the student must successfully defend it before the dissertation committee.

## DISSERTATION DEFENSE

A PhD student must complete and defend a dissertation that involves original research in personal health informatics.

## Curriculum Requirements

### REQUIRED AND ELECTIVE COURSES

The curriculum is designed to provide all PhD students with a strong foundation in principles critical to the design and evaluation of personal health interfaces. All students take six core courses (24 semester hours) and the user-interface practicum (1 semester hour). The student must maintain a minimum GPA of 3.500 among the six core courses and receive a grade of B or better in each of these courses. All students must also fulfill the programming fundamentals requirement (4 semester hours) and the statistics fundamentals requirement (4 semester hours), where some flexibility in course selection allows tailoring based on background and experience. Two additional research electives (8 semester hours) are selected based on research interests from the personal health informatics electives list. Students are also expected to participate in the personal health informatics seminar series during semesters when it is run.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Qualifying examination

Annual review

Dissertation proposal

Dissertation committee

Dissertation defense

## Core Requirements

A grade of B or higher is required in each course. A cumulative 3.500 grade-point average is required for the core requirement.

Code	Title	Hours
<b>Foundations</b>		
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
<b>Program Design and Development</b>		
CS 5010	Programming Design Paradigm (or another programming course)	4
CS 7340	Theory and Methods in Human Computer Interaction	4
HINF 5300	Personal Health Interface Design and Development	4
<b>Methods and Statistics</b>		
CS 7300	Empirical Research Methods for Human Computer Interaction	4
Complete one of the following:		3-4
CAEP 7712	Intermediate Statistical Data Analysis Techniques	
CS 7200	Statistical Methods for Computer Science	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
<b>Evaluation</b>		

HINF 5301	Evaluating Health Technologies	4
HINF 8982	Readings	1-8

**Electives**

Code	Title	Hours
Complete 12–17 semester hours in the following subject areas to fulfill the minimum program hours (see faculty advisor for other acceptable elective courses):		
CAEP		
CS		
HINF		
PTH		

**Dissertation**

Code	Title	Hours
HINF 9990	Dissertation Term 1	
HINF 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Sample Plan of Study**

Code	Title	Hours
<b>Year 1</b>		
<i>Fall Semester</i>		
CS 7340	Theory and Methods in Human Computer Interaction	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
<i>Spring Semester</i>		
CS 5010 or CS 5520	Programming Design Paradigm Mobile Application Development	
CS 7300	Empirical Research Methods for Human Computer Interaction	
<b>Year 2</b>		
<i>Fall Semester</i>		
HINF 5300	Personal Health Interface Design and Development	
PHTH 5210 or PHTH 6440	Biostatistics in Public Health Advanced Methods in Biostatistics	
or CAEP 7712 or CS 7200	Intermediate Statistical Data Analysis Techniques Statistical Methods for Computer Science	
<i>Spring Semester</i>		
HINF 5301	Evaluating Health Technologies	
Personal health informatics electives		
<b>Year 3</b>		
<i>Fall Semester</i>		
HINF 9990	Dissertation Term 1	
HINF 8982	Readings	
<i>Spring Semester</i>		
HINF 9991	Dissertation Term 2	
Personal health informatics electives		
<b>Year 4</b>		
<i>Fall Semester</i>		
HINF 9996	Dissertation Continuation	
<i>Spring Semester</i>		
HINF 9996	Dissertation Continuation	
<b>Year 5</b>		

**Fall Semester**

HINF 9996	Dissertation Continuation
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**Spring Semester**

HINF 9996	Dissertation Continuation
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**Population Health, PhD**

This program seeks to train students to become public health researchers and leaders through simultaneous examination of multiple determinants of health, including social, environmental, nutritional, and behavioral risk factors. Our students investigate the underlying causes of adverse health, including disease, disparities, and disability, through training in core population health disciplines—biostatistics, epidemiology, and health services—together with individual-specific and specialized training in topics related to student research. Importantly, our students are mentored by Northeastern's distinguished faculty, who individually and together conduct innovative, solution-focused research in critical population health topics.

Our population health doctoral students have an opportunity to learn to conduct research that addresses five key health determinants:

1. Social and community contexts
2. Environment and neighborhoods
3. Health and healthcare delivery
4. Education
5. Economic stability

Our diverse faculty has expertise in numerous population health disciplines, including health services research, health disparities, environmental and social epidemiology, biostatistics, exercise science, medical sociology, public policy, personal health technologies, and mental health. Students have the opportunity to work side by side with faculty in conducting cutting-edge, transdisciplinary research in these fields.

**Course Requirements**

All population health PhD candidates must earn at least 33 semester hours by completing core research courses, selecting a concentration and taking courses for that concentration, and taking additional electives and directed study courses as needed and in consultation with their faculty advisors. They must complete a dissertation in order to earn their degree. Eight core courses (22–23 semester hours) must be taken by all students, in addition to a mandatory, non-credit-bearing seminar speaker series. All students must fulfill the requirements of their specific population health option: social and environmental determinants of health or health services and policy. There may be some flexibility in course selection based on a student's relevant experience and dissertation topic. Students must consult with their advisor before selecting elective courses (9–10 semester hours). Electives should be used to either help the student develop skills needed for research or to help the student develop new research ideas.

**ADVANCED ENTRY**

This program is strictly for students who already have a master's degree in public health or a closely related area and have full-time employment at a company or agency who has entered into an agreement with Northeastern to be the student's sponsor. Completion of the PhD program requires 21–23 semester hours, including a yearlong research methods seminar and other advanced research courses. All students must fulfill the course requirements of their specific population health option: social and environmental determinants of health (9 semester hours) or health services and policy (7 semester hours). There may be some flexibility in course selection based on a student's relevant experience and dissertation topic. Students must consult with their advisor before selecting elective courses. Electives can be used to either help the student develop skills needed for research or to help the student develop new research ideas but are not required.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

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*Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Population Health (<https://catalog.northeastern.edu/graduate/health-sciences/community-health-behavioral-sciences/population-health-ms/>) degree. Note that no students will be admitted directly into the Population Health program to pursue a master's degree.*

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

- Qualifying examination
- Annual review
- Dissertation committee
- Dissertation proposal
- Oral defense of dissertation proposal
- Candidacy status
- Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Health Services</b>		
PHTH 5232 or PHTH 5234	Evaluating Healthcare Quality Economic Perspectives on Health Policy	3
<b>Population Health</b>		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
<b>Epidemiology</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3
<b>Research Ethics</b>		
BIOL 6381 or PHSC 5212	Ethics in Biological Research Research Skills and Ethics	2
<b>Research and Analysis</b>		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3

## Options

Complete one of the following options:

### SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3
Electives		2-4

### HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3
Electives		3-4

## Electives

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5110	Microeconomic Theory	
ECON 5140	Applied Econometrics	
ECON 7200	Topics in Applied Economics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	

HRMG 6220	Health Organization Management
PHSC 6216	Human Physiology and Pathophysiology
PHTH 5212	Public Health Administration and Policy
PHTH 5214	Environmental Health
PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5230	Global Health
PHTH 5540	Health Education and Program Planning
PHTH 6200	Principles and History of Urban Health
PHTH 6204	Society, Behavior, and Health
PHTH 6208	Urban Community Health Assessment
PHTH 6320	Qualitative Methods in Health and Illness
STRT 6220	Strategic Management for Healthcare Organizations

## Dissertation

Code	Title	Hours
PHTH 9990	Dissertation Term 1	
PHTH 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Oral defense of dissertation proposal  
Candidacy Status  
Dissertation defense

## Core Requirements

A grade of B or higher is required in all coursework. Students must complete all core requirements unless otherwise indicated:

Code	Title	Hours
<b>Population Health</b>		
PHTH 6400	Principles of Population Health 1	3
PHTH 6410	Principles of Population Health 2	3
<b>Epidemiology</b>		
PHTH 6202	Intermediate Epidemiology	3
<b>Research Ethics</b>		
BIOL 6381 or PHSC 5212	Ethics in Biological Research Research Skills and Ethics	2
<b>Research and Analysis</b>		
PHTH 6210	Applied Regression Analysis	3

## Options

Complete one of the following options:

- Social and Environmental Determinants of Health Option
- Health Services and Policy Option

### SOCIAL AND ENVIRONMENTAL DETERMINANTS OF HEALTH OPTION

Code	Title	Hours
PHTH 6224	Social Epidemiology	3
PHTH 6440	Advanced Methods in Biostatistics	3
PHTH 6800	Causal Inference in Public Health Research	3

### HEALTH SERVICES AND POLICY OPTION

Code	Title	Hours
ECON 5110	Microeconomic Theory	4
PHTH 5234	Economic Perspectives on Health Policy	3

## Electives

Students may elect to take additional course credits to support their dissertation work.

Code	Title	Hours
CS 6220	Data Mining Techniques	
CS 7280	Special Topics in Database Management	
ECON 5140	Applied Econometrics	
EXSC 5200	Cardiopulmonary Physiology	
EXSC 5220	Advanced Exercise Physiology	
EXSC 5230	Physical Activity and Exercise: Effects on Musculoskeletal Health and Disease	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HRMG 6220	Health Organization Management	
PHSC 6216	Human Physiology and Pathophysiology	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5540	Health Education and Program Planning	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
PHTH 6208	Urban Community Health Assessment	
PHTH 6320	Qualitative Methods in Health and Illness	
STRT 6220	Strategic Management for Healthcare Organizations	

## Dissertation

Code	Title	Hours
PHTH 9990	Dissertation Term 1	
PHTH 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

Minimum 21 total semester hours required

Minimum 3.000 GPA required

## Public Health, MPH

Through innovation in experiential education, research, and service, the Master of Public Health at Northeastern University (<https://bouve.northeastern.edu/health-sciences/programs/master-public-health/>) trains diverse and skilled professionals who promote and protect the health of all communities. This program is accredited by the Council on Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## MPH—Traditional

In order to help prepare the next generation of public health leaders and professionals, the MPH offers our diverse graduate students an opportunity to:

- Participate in learning options that meet the needs of the working professional:
  - On-ground, Boston courses are offered in the evening (most classes meet once a week from 5:00 p.m. to 7:30 p.m.)
  - Enroll as either a full-time or part-time student
  - Complete your degree online, on-ground, or in hybrid format (combination of both)
  - MPH students on the Charlotte campus participate in residency courses to fulfill experiential and core coursework
- Take 9 semester hours of elective coursework in emerging, relevant areas in the field, including public mental health and public health technologies, or choose electives from a wide range of topics including cross-departmental offerings from Northeastern's other colleges (law, business, social sciences, and more)
- Enjoy a supportive learning environment that includes outstanding student mentoring

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Traditional Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in each required course.

Code	Title	Hours
<b>Public Health Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Social Determinants of Health Core</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Experiential Core</b>		
PHTH 6910	Public Health Capstone	3
PHTH 6966	Practicum	3

### Electives

Code	Title	Hours
Complete 9 semester hours from the following (in consultation with your faculty advisor, you may complete electives from another discipline):		
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	
PHTH 5234	Economic Perspectives on Health Policy	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	

PHTH 5320	Grant Writing in Public Health
PHTH 5350	Using SAS in Public Health Research
PHTH 5540	Health Education and Program Planning
PHTH 6202	Intermediate Epidemiology
PHTH 6210	Applied Regression Analysis
PHTH 6224	Social Epidemiology
PHTH 6320	Qualitative Methods in Health and Illness
PHTH 6400	Principles of Population Health 1
PHTH 6410	Principles of Population Health 2
PHTH 6440	Advanced Methods in Biostatistics
PHTH 6800	Causal Inference in Public Health Research
PPUA 6509	Techniques of Program Evaluation
<i>Public Health Technologies</i>	
HINF 5102	Data Management in Healthcare
HINF 6400	Introduction to Health Data Analytics
PHTH 6130	Public Health Technologies: Ethics and Equity
<i>Public Mental Health</i>	
CAEP 6100	Prevention and Intervention: Evidence-Based Practices
CAEP 6110	Etiology-Psychopathology Across the Life Span
CAEP 6220	Development Across the Life Span

## Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.000 GPA required

## Public Health, MPH—Accelerated

Through innovation in experiential education, research, and service, the Master of Public Health at Northeastern University (<https://bouve.northeastern.edu/health-sciences/programs/master-public-health/>) trains diverse and skilled professionals who promote and protect the health of all communities. This program is accredited by the Council on Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## MPH—One-Year Accelerated

The one-year accelerated MPH pathway allows students to complete all degree components in 12 months with an emphasis on public health practice and industry partnerships. This is a full-time, asynchronous online program for midcareer professionals that offers an opportunity to:

- Take 9 semester hours of elective coursework from a wide range of practical, public health topics including cross-departmental offerings
- Fulfill experiential coursework through industry partnerships and faculty networking
- Enjoy a supportive learning environment that includes outstanding student mentoring

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B– or higher is required in each required course.

Code	Title	Hours
<b>Required Core</b>		
PHTH 5202	Introduction to Epidemiology	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 5212	Public Health Administration and Policy	3
PHTH 5214	Environmental Health	3
PHTH 5540	Health Education and Program Planning	3
PHTH 6204	Society, Behavior, and Health	3
<b>Social Determinants of Health Core</b>		
PHTH 5120	Race, Ethnicity, and Health in the United States	3
PHTH 6200	Principles and History of Urban Health	3
PHTH 6208	Urban Community Health Assessment	3
<b>Experiential</b>		
PHTH 6910	Public Health Capstone	3
PHTH 6966	Practicum	3

## Electives

Code	Title	Hours
Complete 9 semester hours from the following (in consultation with your faculty advisor, you may complete electives from another discipline):		
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5300	Project Management in Public Health	
PHTH 5310	Budget Principles in Public Health	
PHTH 5320	Grant Writing in Public Health	
PHTH 5540	Health Education and Program Planning	
PHTH 6320	Qualitative Methods in Health and Illness	
PHTH 6400	Principles of Population Health 1	
PHTH 6410	Principles of Population Health 2	
PHTH 6962	Elective	

## Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

Year 1									
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours	Summer Full Semester	Hours
Fall A		Spring A		Elective 1		Elective 3		3 PHTH 6910	3
PHTH 6200	3	PHTH 5212		3 Elective 2		3			
PHTH 6208	3	PHTH 5120		3					
Fall B		Spring B							
PHTH 6204	3	PHTH 5214		3					
PHTH 5540	3	Full Spring							
Full Fall		PHTH 5202		3					
PHTH 5210	3	PHTH 6966		3					
	15		15		6		3		3

Total Hours: 42

## Complex Network Analysis, MS

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are

ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4
NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4
NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

### Concentrations

Complete one of the following concentrations:

- Complex Social Systems (p. 651) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 652) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 652) (College of Science and Bouvé College of Health Sciences)

### Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	4
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

**Optional Co-op**

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

**Program Credit/GPA Requirements**

36–37 total semester hours required

Minimum 3.000 GPA required

**COMPLEX SOCIAL SYSTEMS CONCENTRATION**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**ECONOMIC AND TECHNOLOGICAL NETWORKS**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
CS 7150	Deep Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**POPULATION HEALTH DYNAMICS CONCENTRATION**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
BINF 6308	Bioinformatics Computational Methods 1	
NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

## Health Informatics, MS

Northeastern University's interdisciplinary Master of Science in Health Informatics was the first MS in the field and is now one of the few that is fully interdisciplinary between health science and computer science.

The program seeks to prepare students to address the combined clinical, technical, and business needs of health-related professionals. Students may opt to select a concentration to deepen their knowledge in a particular area. Successful students graduate with the knowledge of how technology, people, health, and the healthcare system interrelate; the ability to use technology and information management to improve healthcare delivery and outcomes; and the skills to communicate effectively among healthcare practitioners, administrators, information technology professionals, and patients.

Please visit Bouvé College Learning Outcomes (<http://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

A grade of B– or higher is required in each course.

### Core Requirements

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
Choose one of the following courses in consultation with your advisor:		
HINF 5105 or HINF 5106	The American Healthcare System The Canadian Healthcare System	3

### Program Options

Choose one of the following options:

- Health Informatics (Without Concentration) (p. 653)
- Health Informatics with Health Informatics Analytics Concentration (p. 654)
- Health Informatics with Personal Health Informatics Concentration (p. 655)

### Program Credit/GPA Requirements

Minimum 33 total semester hours required

Minimum 3.000 GPA required

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### HEALTH INFORMATICS (WITHOUT CONCENTRATION)

Code	Title	Hours
<b>Required Coursework in Addition to Core Requirements</b>		
<i>Business Management</i>		
Complete two of the following:		6
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215 or EMGT 5220	Project Management Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	

**Health Informatics**

Complete two of the following:

6

HINF 5102	Data Management in Healthcare
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 5300	Personal Health Interface Design and Development
HINF 5301	Evaluating Health Technologies
HINF 6205	Creation and Application of Medical Knowledge
HINF 6350	Public Health Surveillance and Informatics
HINF 6404	Patient Engagement Informatics and Analytics
HINF 6405	Quantifying the Value of Informatics
PHTH 5232	Evaluating Healthcare Quality

**Technical**

Complete two of the following:

6

HINF 6220	Database Design, Access, Modeling, and Security
HINF 6355	Interoperability Key Standards in Health Informatics
HINF 6400	Introduction to Health Data Analytics
PHTH 5202	Introduction to Epidemiology
PHTH 5210	Biostatistics in Public Health
PHTH 6210	Applied Regression Analysis
PHTH 6400	Principles of Population Health 1
PHTH 6440	Advanced Methods in Biostatistics

One course from the following may count toward the technical core requirement:

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

**Capstone**

HINF 7701	Health Informatics Capstone Project	3
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**Electives**

Complete two of the following:

6

DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
HINF 6345	Design for Usability in Healthcare
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics

**HEALTH INFORMATICS ANALYTICS CONCENTRATION**

Code	Title	Hours
<b>Required Coursework in Addition to Core Requirements</b>		
<i>Business Management</i>		
Complete two of the following:		
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management	
HINF 6202	Business of Healthcare Informatics	
HINF 6215 or EMGT 5220	Project Management Engineering Project Management	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6240	Improving the Patient Experience through Informatics	
PHTH 5226	Strategic Management and Leadership in Healthcare	
<i>Health Informatics</i>		
Complete two of the following:		
HINF 5102	Data Management in Healthcare	
HINF 5110	Global Health Information Management	
HINF 5200	Theoretical Foundations in Personal Health Informatics	

HINF 5300	Personal Health Interface Design and Development	
HINF 5301	Evaluating Health Technologies	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6350	Public Health Surveillance and Informatics	
HINF 6404	Patient Engagement Informatics and Analytics	
HINF 6405	Quantifying the Value of Informatics	
PHTH 5232	Evaluating Healthcare Quality	
<b>Technical</b>		
IE 6200	Engineering Probability and Statistics	4
OR 6205	Deterministic Operations Research	4
<b>Capstone</b>		
HINF 7701	Health Informatics Capstone Project	3
<b>Elective</b>		
Complete one of the following:		
IE 5137	Computational Modeling in Industrial Engineering	
IE 5390	Structured Data Analytics for Industrial Engineering	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5640	Data Mining for Engineering Applications	
IE 6600	Computation and Visualization for Analytics	
IE 6700	Data Management for Analytics	
IE 7275	Data Mining in Engineering	

**PERSONAL HEALTH INFORMATICS CONCENTRATION**

Code	Title	Hours
<b>Required Coursework in Addition to Core Requirements</b>		
<i>Health Informatics</i>		
HINF 6205	Creation and Application of Medical Knowledge	3
<i>Technical</i>		
CS 5340	Computer/Human Interaction	4
Complete one of the following. Students must petition to take electives outside the approved list:		
CS 5010	Programming Design Paradigm	
CS 5520	Mobile Application Development	
CS 5610	Web Development	
CS 6200	Information Retrieval	
Complete one of the following:		
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	
<i>Theory and Evaluation</i>		
PHTH 5210	Biostatistics in Public Health <sup>1</sup>	3
Complete one of the following:		
CS 6350	Empirical Research Methods (On campus only)	
HINF 5200	Theoretical Foundations in Personal Health Informatics	
<i>Culminating Experience</i>		
Complete one of the two options below.		
<i>Thesis Option</i>		
Students must enroll in HINF 7990 for two semesters for a total of 6 semester hours with director approval only and under supervision of Personal Health Informatics faculty.		
HINF 7990	Thesis	
<i>Capstone Option</i>		
HINF 7701	Health Informatics Capstone Project	
Complete any course for a minimum of 3 semester from the Health Informatics (without concentration) curriculum, that has not been used in previous requirements.		

<sup>1</sup> Student may petition director to take a more advanced stats course, such as Applied Regression Analysis (PHTH 6210).

## Real-World Evidence in Healthcare and Life Sciences, MS

### Overview

The Master of Science in Real-World Evidence (RWE) is an interdisciplinary, flexible, and contemporary degree that focuses on best practices for the appropriate acquisition and analysis of observational health data. Housed in the Department of Health Sciences and the Roux Institute, learners explore how observational research produces a comprehensive understanding of disease, including experience with appropriate methods and software to conduct this research.

RWE is the clinical evidence regarding the usage and potential benefits, or risks, of a medical product derived from analysis of real-world data (RWD). RWE can be generated by different study designs or analyses, including but not limited to randomized trials, pragmatic trials, and observational studies. RWD are the data relating to patient health status and/or the delivery of healthcare routinely collected from a variety of sources, for example, electronic health records, claims, and billing activities.

RWD and RWE are playing an increasing role in healthcare decisions. The FDA uses RWD and RWE to monitor postmarket safety and to make regulatory decisions. The healthcare community uses these data to support coverage decisions and to develop guidelines and decision support tools for clinical practice. Medical product developers use RWD and RWE to support clinical trial designs and observational studies to generate innovative, new treatment approaches.

This program is based on open, reproducible science—including the use of common data models and open-source analytics software to codify these practices into consistent, transparent, reproducible solutions—and applies these tools and practices to answer clinical questions by generating evidence to guide healthcare policy and improve patient outcomes.

The program seeks to educate two key professionals: analysts and researchers.

An analyst is a technician (e.g., solution architect, epidemiologist, data scientist, etc.) who is engaging in RWE studies by utilizing statistical tools and epidemiologic methods to operationalize and analyze RWD. Technicians may be carrying out activities on behalf of an institution or may be working as individuals interested in the technology that RWD offers. They may be involved in any stage of the RWD/RWE continuum (extract-transform-load [ETL]/data quality processes, tool enablement and self-service analytics, visualization, communication) and are often interested in extending these resources to serve additional use cases or new functionality.

A researcher is one who originates from any number of backgrounds (statistics, clinical training, public health, biological sciences, data science, etc.) who engages in the RWD community for the sake of designing and conducting a research study. Researchers want to know how to run their own observational research studies. In their day, researchers were often responsible for translating the science into better decisions and better care.

The intent of this program is to curate interdisciplinary expertise to support the evidence-generation process in the pharmacoepidemiology research community. The curriculum aims to ensure that learners can obtain in-demand skills that are immediately deployable in roles at pharmaceutical companies, regulatory authorities, health systems, technology companies, and consulting groups specializing in life sciences and healthcare.

Please visit Bouvé College Learning Outcomes for the specific student learning outcomes for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in each course.

Code	Title	Hours
HSCI 5130	Introduction to Real-World Evidence	2
HSCI 5140	Foundations of Data Models	2
HSCI 5150	Methods for Observational Research 1	3
HSCI 5151	Methods for Observational Research 2	3
HSCI 5160	Standardization of Real-World Data	2

HSCI 5170	Data Model Transformation	2
PHSC 5212	Research Skills and Ethics	2
<b>Capstone Requirement</b>		
HSCI 6980	Real-World Evidence Capstone	3

## Selectives

Code	Title	Hours
Complete a minimum of 6 semester hours from the following:		
HSCI 5180	Phenotyping	
HSCI 5190	Cohort Building	
HSCI 6110	Advanced Population Characterization	
HSCI 6120	Advanced Population Estimation	
HSCI 6130	Advanced Patient Prediction	

## Electives

Code	Title	Hours
Complete up to 6 semester hours from the following (electives are selected in consultation with the program director):		
HINF 5300	Personal Health Interface Design and Development	6
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6355	Interoperability Key Standards in Health Informatics	

## Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

## Statistics, MS

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

## Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 659) (Bouvé College of Health Sciences)
- Statistical Machine Learning (p. 660) (Khoury College of Computer Sciences)
- Statistical Theory and Modeling (p. 660) (College of Science)

## Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

## Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	0
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	0

## Program Credit/GPA Requirements

31–32 total semester hours required

Minimum 3.000 GPA required

### BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

### STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	12

**Statistics, MS—Connect**

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Connect Courses**

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		
CS 5001	Intensive Foundations of Computer Science	8-10
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

## Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

## Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 661) (Bouvé College of Health Sciences (<http://northeastern.edu/bouve/>))
- Statistical Machine Learning (p. 662) (Khoury College of Computer Sciences (<https://khoury.northeastern.edu/>))
- Statistical Theory and Modeling (p. 662) (College of Science (<http://www.northeastern.edu/cos/>))

## Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

## Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000 Professional Development for Co-op		
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	

## Program Credit/GPA Requirements

39-41 total semester hours required

Minimum 3.000 GPA required

### BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

### STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Law, JD / Public Health, MPH**

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See the JD/MPH program page (<https://law.northeastern.edu/academics/programs/jd/dual-degrees/public-health-bouve/>) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

**Pharmacy, PharmD–Direct Entry / Public Health, MPH**

The School of Pharmacy and Pharmaceutical Sciences and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy and Pharmaceutical Sciences PharmD–Direct Entry (p. 782) and Department of Health Sciences Master of Public Health (p. 710) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council of Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

**Public Health, MPH / Health Informatics, MS**

Website (<https://bouve.northeastern.edu/health-sciences/programs/ms-hinf-mpn/>)

The Master of Public Health and Master of Science in Health Informatics dual degree allows qualified and interested students to prepare to lead healthcare at the nexus between public health and health informatics. Graduates of this program will be well-educated in the complex issues associated with improvements in information technology, as well as changes to the public health and healthcare delivery systems. Recognizing the increasing overlap between health informatics and public health, this program incorporates course work from both the MPH and MSHI curricula for both degrees, reducing tuition costs and saving one year of study compared to obtaining both degrees individually.

The Northeastern University Master of Public Health program is accredited by the Council on Education for Public Health (CEPH) (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

Up to 15 credits of coursework in the dual-degree program can be counted toward both the MPH and MS degrees.

## AI Applications, Graduate Certificate

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- D'Amore-McKim School of Business
- Mills College at Northeastern

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

### Experiential Courses

Code	Title	Hours
Complete 4 semester hours from the following:		
EDUT 6150	AI in Education	4
HLTH 5800	AI Across the Health Sciences	4
IE 5640	Data Mining for Engineering Applications	4
JRNL 6460	AI in Media Industries	4
MISM 6250	Strategic AI for Business	4

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Health Informatics Management and Exchange, Graduate Certificate

### Overview

The certificate program in health informatics management and exchange offers you the opportunity to obtain the knowledge needed to support the collection, management, retrieval, and exchange of electronic health data. It is designed to prepare you for a position as a specialist in data management, interoperability standards, and health database design.

- Eight-month program
- Five courses, 15 semester hours

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6220	Database Design, Access, Modeling, and Security	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

### Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

## Health Informatics Privacy and Security, Graduate Certificate

### Overview

The certificate program in health informatics privacy and security combines knowledge of health informatics with a strong foundation in important information security issues. Northeastern's status as a National Security Agency Center of Excellence for Information Security Education and Research ensures the program is both relevant and of high academic quality.

- Eight-month program
- Five courses, 18 semester hours

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Privacy and Security</b>		

CY 5130	Computer System Security	4
CY 5150	Network Security Practices	4
CY 5200	Security Risk Management and Assessment	4

## Program Credit/GPA Requirements

18 total semester hours required

Minimum 3.000 GPA required

### Health Informatics Software Engineering, Graduate Certificate

#### Overview

This certificate program offers software engineers the background in health informatics (as well as interchange and interoperability standards) needed to better understand the context in which they work and perform effectively in a health-related organization. Program design is flexible to allow completion on a rapid schedule or a slower pace that is more compatible with full-time workers.

- Eight-month program
- Five courses, 15 semester hours

#### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

#### Core Requirements

A grade of B– or higher is required in all course work.

Code	Title	Hours
<b>Required Core</b>		
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
<b>Management and Exchange</b>		
HINF 6205	Creation and Application of Medical Knowledge	3
HINF 6345	Design for Usability in Healthcare	3
HINF 6355	Interoperability Key Standards in Health Informatics	3

#### Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

### School of Nursing

Website (<https://bouve.northeastern.edu/nursing/>)

**Amanda Choflet, DNP, RN, NEA-BC**

Dean and Clinical Professor, School of Nursing

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This is an exciting time in healthcare, and nursing plays a pivotal role in the transformation of our healthcare system. Northeastern University School of Nursing offers multiple options for graduate study, including master's, Doctor of Nursing Practice, and PhD degree programs, as well as Certificate of Advanced Graduate Study programs, that are designed to prepare outstanding clinicians, leaders, scholars, educators, and policymakers. These programs leverage the school's renowned faculty, as well as exceptional clinical practicum sites. Our reputation is why our graduates are sought by

top employers. Practicing advanced practice nurses may easily change their specialty area by enrolling in one of our CAGS programs in adult primary or acute, pediatric primary and acute, family, or mental health.

The master's program includes advanced practice degrees as well as a Master of Science in Nursing Leadership with three concentration options. Graduates of the master's program function as advanced practice nurses and nurse leaders with roles in a variety of practice settings such as primary and acute care providers, patient safety specialists, executive nurse leaders, and clinical educators.

The DNP program is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our BS-DNP and post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The PhD program in nursing prepares research scientists, educators, and leaders who seek to improve health and healthcare across the life span with an emphasis on urban, vulnerable, and underserved populations. Graduates are expected to lead research initiatives that advance nursing science through knowledge development and interdisciplinary scholarly inquiry.

Further information about the degrees and specializations can be found at each program's page of this catalog.

## **Programs**

### **Doctor of Philosophy (PhD)**

- Nursing (p. 728)

### **Doctor of Nursing Practice (DNP)**

- Nurse Anesthesia (p. 731)
- Nursing (p. 732)
- Nursing—Post-Master's (p. 735)

### **Certificate of Advanced Graduate Study (CAGS)**

- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Acute Care (p. 736)
- Nursing with Concentration in Adult-Gerontology Nurse Practitioner, Primary Care (p. 737)
- Nursing with Concentration in Neonatal Nurse Practitioner (p. 738)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute Care (p. 739)
- Nursing with Concentration in Pediatric Nurse Practitioner, Acute and Primary Care (p. 739)
- Nursing with Concentration in Pediatric Nurse Practitioner, Primary Care (p. 740)
- Nursing with Concentration in Psychiatric-Mental Health Nurse Practitioner (p. 741)

### **Master of Science (MS)**

- Nursing (p. 742)
- Nursing—Direct Entry (p. 746)
- Nursing Leadership (p. 751)

### **Graduate Certificate**

- Patient Safety (p. 666)
- Pediatric Nurse Practitioner, Acute Care (p. 753)
- Primary Care Nursing FNP (p. 754)

## **Nursing, PhD**

### **Overview**

### **Research**

The PhD in Nursing program is designed to prepare nurse researchers to advance the science of nursing by developing expertise in both leadership and innovation. Graduates are expected to lead multidisciplinary research initiatives that advance nursing and healthcare through knowledge development and interdisciplinary scholarly inquiry. Students will work with nursing faculty whose research addresses innovative questions that seek to advance knowledge for improvement of care. Students will have opportunities to collaborate with faculty across the broader Northeastern University community, in addition to Boston-area research and healthcare institutions. This collaboration allows students to work across disciplines and to access populations and research sites essential to the success of their original dissertation study.

Advanced entry into the PhD in Nursing program requires a master's degree in nursing.

Visit the Northeastern University Faculty Research site (<https://research.northeastern.edu/faculty-research/>) for more information.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/academics/learning-outcomes/>) for the specific student learning outcomes for this program.

*Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS (<https://catalog.northeastern.edu/graduate/health-sciences/nursing/applied-nursing-research-ms/>) Applied Nursing Research degree. Note that no students will be admitted directly into the Applied Nursing Research program to pursue a master's degree.*

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Bachelor's Degree Entrance

A bachelor's degree in nursing is preferred. Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review of progress  
Comprehensive examination  
Candidacy status  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Required Core</b>		
NRSG 7104	Foundations in Nursing Research	3
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7750	Healthcare of Urban Populations	3
<b>Statistics</b>		
NRSG 5121	Epidemiology and Population Health	3
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3
<b>Research</b>		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		6
NRSG 9984	Research	
<b>Cognate Courses</b>		
Complete two cognate courses in consultation with your faculty advisor. Cognates are graduate-level courses that are taken outside of nursing. These courses should provide depth and breadth to the student's dissertation research.		6

## Electives

Code	Title	Hours
Complete two elective courses in consultation with your faculty advisor. Electives may be taken in nursing or in an area related to the student's dissertation research, including appropriate methodology and statistics courses.		
		6

## Dissertation

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
NRSG 9990	Dissertation Term 1	
NRSG 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

58 total semester hours required

Minimum 3.000 GPA required

## Advanced Entry Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Annual review of progress
- Comprehensive examination
- Candidacy status
- Dissertation committee
- Dissertation proposal
- Dissertation defense

### Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Required Core</b>		
NRSG 7700	The Science of Nursing	3
NRSG 7705	Theoretical and Conceptual Foundations in Nursing Science	3
NRSG 7750	Healthcare of Urban Populations	3
<b>Statistics</b>		
PHTH 5210	Biostatistics in Public Health	3
PHTH 6210	Applied Regression Analysis	3
<b>Cognate Courses<sup>1</sup></b>		
Complete two cognate courses in consultation with your faculty adviser.		
<b>Research</b>		
NRSG 7709	Qualitative Research Methods	3
NRSG 7712	Quantitative Research Methods	3
NRSG 7715	Measurement in Clinical Research	3
NRSG 7755	Intervention Research: Development, Implementation, and Evaluation	3
NRSG 7770	Research Colloquium	1
Complete the following (repeatable) course twice:		
NRSG 9984	Research	6

### Dissertation Courses

Code	Title	Hours
NRSG 9845	Dissertation Seminar 1	3
NRSG 9846	Dissertation Seminar 2	3
NRSG 9990	Dissertation Term 1	
NRSG 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

46 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Cognates are graduate-level courses that are taken outside of nursing and should provide depth and breadth to the student's area of interest.

## Nurse Anesthesia, DNP

The Doctor of Nursing Practice in Nurse Anesthesia is a practice-oriented degree designed to prepare nurse anesthetists at the highest level of clinical scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. The program prepares graduates to question practice, search for and critically appraise the best evidence to guide practice, and implement and evaluate the application of best evidence in practice.

A successful graduate from the program will gain the requisite skill set and leadership expertise to be a critical member of the healthcare team and provide anesthetics to patients throughout the life cycle in diverse settings such as small local hospitals, regional centers, and rural or urban settings for all types of surgery or procedures.

### Transfer Policy

Northeastern University regulations for transfer credit are published in this catalog (p. 191). The transfer policy specific to this doctoral program is defined as a maximum of 9 semester hours or 12 quarter hours of credit earned at another institution may be accepted toward the degree being pursued at Northeastern, provided the credits:

1. Consist of work taken at the graduate level for graduate credit
2. Carry grades of 3.000 or better
3. Have been earned at an accredited institution
4. Have not been used toward any baccalaureate or advanced degree or certificate at another institution
5. Transfer credits must be approved by the program administrator and course faculty

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

A grade of B or higher is required in all coursework.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
<b>Didactic</b>		
NRSG 7500	Role/Practice Issues in Nurse Anesthesia	3
NRSG 7503	Pharmacotherapeutics in Anesthesia and Critical Care Nursing	3
NRSG 7506	Applied Chemistry, Physics, and Cardiopulmonary Physiology of Anesthesia	3
NRSG 7509	Advanced Concepts in Nurse Anesthesia Practice	3
NRSG 7511	Applied Gross Anatomy and Physiology of Anesthesia	3
NRSG 7520	Conceptual Basis of Nurse Anesthesia Practice 1	3
NRSG 7523	Conceptual Basis of Nurse Anesthesia Practice 2	3
NRSG 7526	Conceptual Basis of Nurse Anesthesia Practice 3	3

**Practicum**

NRSG 7530	Nurse Anesthesia Practicum 1	3
NRSG 7533	Nurse Anesthesia Practicum 2	3
NRSG 7536	Nurse Anesthesia Practicum 3	4

**Research**

NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3

**Project**

NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3

NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3
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**Clinical**

NRSG 7540	Advanced Clinical Experiences in Nurse Anesthesia 1	1
NRSG 7543	Advanced Clinical Experiences in Nurse Anesthesia 2	2

NRSG 7546	Advanced Clinical Experiences in Nurse Anesthesia 3	2
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**Program Credit/GPA Requirements**

77 total semester hours required

Minimum 3.000 GPA required

**Nursing, DNP**

The Northeastern University Doctor of Nursing Practice program is designed to prepare future nurse leaders by integrating advanced evidence-based clinical practice, interdisciplinary collaboration, healthcare innovation, fiscal responsibility, and principles of leadership to impact patient and/or system-level outcomes. Utilizing implementation science and project management theory, the DNP students design and implement a DNP project that may include new models of care, implementing and evaluating evidence-based practice guidelines, performing a financial analysis of varying models of care, or analyzing and/or implementing healthcare policy. This Nursing, DNP program can be completed in 33 months of full-time study and is designed for students entering with a BS in Nursing who intend to practice as nurse practitioners.

Students who already possess a master's nursing degree (Post-Masters) and intend to complete the DNP should consider the Nursing, DNP-Post-Master's (<https://catalog.northeastern.edu/graduate/health-sciences/nursing/nursing-practice-dnp/>) program. Students entering with a bachelor's nursing degree who intend to practice as nurse executives, nurse educators, or patient safety specialists should consider the MS Nursing Leadership (p. 751) program. Students entering with a bachelor's nursing degree who intend to practice as nurse anesthetists should consider the Nurse Anesthesia, DNP (p. 731) program.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3

NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7500	Role/Practice Issues in Nurse Anesthesia	3
NRSG 7911	DNP Project Immersion 1	1
NRSG 7912	DNP Project Immersion 2	1
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3
NRSG 7926	Applied Data Management	2

## Concentrations

A concentration is required to complete this program.

- Adult-Gerontology Nurse Practitioner, Acute Care (p. 733)
- Adult-Gerontology Nurse Practitioner, Primary Care (p. 733)
- Family Nurse Practitioner, Primary Care (p. 734)
- Neonatal Nurse Practitioner, Acute Care (p. 734)
- Pediatric Nurse Practitioner, Acute and Primary Care (p. 734)
- Pediatric Nurse Practitioner, Primary Care (p. 735)
- Psychiatric-Mental Health Nurse Practitioner (p. 735)

## Program Credit/GPA Requirements

Total program hours vary based on the concentration the student chooses

Minimum 3.000 GPA required

### CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, ACUTE CARE

Code	Title	Hours
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
NRSG 6243	Diagnostic Reasoning and Clinical Decision Making in Acute Care	2
NRSG 6245	Advanced Practice Colloquium in Acute Care	2
NRSG 6246	Acute Care Pharmacology	2
NRSG 7220	Acute Care Practicum 1 (Adult-Gerontology)	4
NRSG 7221	Acute Care Practicum 2 (Adult-Gerontology)	4
NRSG 7222	Acute Care Practicum 3 (Adult-Gerontology)	4

### PROGRAM CREDIT REQUIREMENT

72 total semester hours required, including program core requirements

### CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, PRIMARY CARE

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	3
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	3
NRSG 6560	Nurse Practitioner Clinical Intensive	1
NRSG 6561	Advanced Nurse Practitioner Clinical Intensive	1
NRSG 7440	Adult/Older Adult Gerontology Primary Care Nursing Practicum 1	4

NRSG 7441	Adult/Older Adult Gerontology Primary Care Nursing Practicum 2	4
NRSG 7442	Adult/Older Adult Gerontology Primary Care Nursing Practicum 3	4

**PROGRAM CREDIT REQUIREMENT**

70 total semester hours required, including program core requirements

**NURSING CONCENTRATION IN FAMILY NURSE PRACTITIONER, PRIMARY CARE**

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6392	Family Theory	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6397	Healthcare of Women and the Pregnant Individual in Family Practice	3

**PROGRAM CREDIT REQUIREMENT**

72 total semester hours required, including program core requirements

**CONCENTRATION IN NEONATAL NURSE PRACTITIONER, ACUTE CARE**

Code	Title	Hours
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
NRSG 6392	Family Theory	2
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2

**PROGRAM CREDIT REQUIREMENT**

68 total semester hours required, including program core requirements

**CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, ACUTE AND PRIMARY CARE**

Code	Title	Hours
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6276	Diagnostic Reasoning and Clinical Decision Making in PNP Practice	2
NRSG 6459	Pediatric NP Practicum 1	2
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

**PROGRAM CREDIT REQUIREMENT**

82 total semester hours required, including program core requirements

**CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, PRIMARY CARE**

Code	Title	Hours
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6276	Diagnostic Reasoning and Clinical Decision Making in PNP Practice	2
NRSG 6459	Pediatric NP Practicum 1	2
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5

**Program Credit Requirement**

71 total semester hours required, including program core requirements

**CONCENTRATION IN PSYCHIATRIC-MENTAL HEALTH NURSE PRACTITIONER**

Code	Title	Hours
NRSG 6281	Dimensions of Clinical Psychiatric Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Health	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
NRSG 6561	Advanced Nurse Practitioner Clinical Intensive	1
NRSG 7480	Advanced Psychiatric Nursing Practicum 1	4
NRSG 7481	Advanced Psychiatric Nursing Practicum 2	4
NRSG 7482	Advanced Psychiatric Nursing Practicum 3	4

**PROGRAM CREDIT REQUIREMENT**

70 total semester hours required, including program core requirements

**Nursing, DNP—Post-Master's**

The Doctor of Nursing Practice (DNP) is a practice-oriented degree designed to prepare advanced nurses at the highest level of scholarly practice. Keeping pace with the demands of today's changing healthcare environment requires clinical experts who have the knowledge and skills to be effective change agents. Graduates of our post-master's DNP program assume clinical and leadership positions as advanced nurses in a variety of roles including clinical experts, nurse executives, community leaders, and professional organization leaders.

The Northeastern University post-master's DNP program includes advanced course work in leadership, practice inquiry, population health, informatics, and health policy. Our goal is to prepare the next generation of nurse leaders with a greater breadth of expertise so they can collaborate more effectively with interprofessional partners and provide leadership to enhance quality and safety. The DNP program curriculum is delivered online in an executive model hybrid format, with the on-ground meetings at the Boston campus.

If you are a registered nurse with at least two years of active advanced nursing experience, you may enter the DNP program after completing a master's degree in nursing or, in some cases, a related health field. A DNP Scholarly Project and 1,000 scholarly practice hours are required for program completion. A gap analysis upon admission will determine how many, if any, practice hours from a previously completed Master of Science in Nursing practicum qualify toward this practice hour requirement. An ePortfolio is used to document all scholarly practice hours and DNP program achievements.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7924	Applied Epidemiology for Advanced Nursing	3
NRSG 7925	Health Policy and Advocacy	3
<b>Project</b>		
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7921	DNP Scholarly Project 1: Design and Ethical Consideration of Practice Application	3
NRSG 7922	DNP Scholarly Project 2: Applying Practice Knowledge—Implementation/Outcomes	3
NRSG 7923	DNP Scholarly Project 3: Dissemination of Practice Inquiry	3

## Elective

Code	Title	Hours
Complete 3 semester hours, selected in consultation with faculty program advisor.		3

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Nursing—Adult-Gerontology Nurse Practitioner, Acute Care, CAGS

The adult-gerontology acute-care nurse practitioner program is designed to prepare nurses for advanced-practice roles as clinical experts, managers, educators, and consultants. The program offers advanced study with a major focus on clinical experience. Nurses who possess a Master of Science are eligible for the Certificate of Advanced Graduate Study (CAGS) in this specialization.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Theory</b>		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
<b>Practicum</b>		
NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2

NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4

## Electives

Code	Title	Hours
Complete 5 semester hours in the following subject area:		
NRSG		5

## Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

### Nursing—Adult-Gerontology Nurse Practitioner, Primary Care, CAGS

The Certificate of Advanced Graduate Study (CAGS) with a concentration in Primary Care Adult-Gerontology Nurse Practitioner offers nurse practitioners (NPs) with certification in a different specialty the opportunity to prepare for practice providing high-quality adult primary care services as an adult-gerontology NP. Adult-gerontology NPs provide services to individuals across most of the life span in clinics, private practices, home care, long-term care, and day programs. Upon completion of the primary care program, graduates are eligible to sit for the adult-gerontology certification exam.

## Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of the student's background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Core Requirements

Students should refer to the Program Overview page for required program prerequisites.

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Required Courses</b>		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	3
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	3
NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	5
NRSG 6451	Adult/Older Adult Practicum 2	5
Elective		2

## Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

## Nursing—Neonatal Nurse Practitioner, CAGS

The School of Nursing offers a certificate of advanced study for experienced nurses who have a master's degree in nursing and want to specialize in neonatal critical care. Applicants are required to have at least two years of level-3 or greater of neonatal intensive care unit experience before entering the program; most applicants have greater relevant experience. One year of full-time study offers the student an opportunity to increase skills and experience and enables the student to sit for the neonatal nurse practitioner certification exam offered by the National Certification Corporation for the obstetric, gynecologic, and neonatal nursing specialties.

### Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of the student's background, must have completed coursework with content equivalent to the following courses with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	
NRSG 5126	Pathophysiology for Advanced Practice	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Clinical</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
<b>Practicum</b>		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2

### Elective

Code	Title	Hours
NRSG	Select courses in consultation with faculty advisor.	3

### Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

## Nursing—Pediatric Nurse Practitioner, Acute Care, CAGS

The Certificate of Advanced Graduate Study (CAGS) with a concentration in Acute Care Pediatric Nurse Practitioner (PNP) is designed for nurses who possess an MS degree in nursing. Such applicants are eligible to apply for admission to this CAGS program for advanced preparation as a PNP.

### Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Students should refer to the program overview page for required program prerequisites.

A grade of B or higher is required in all coursework.

Code	Title	Hours
<b>Required Courses</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

### Program Credit/GPA Requirements

25 total semester hours required

Minimum 3.000 GPA required

## Nursing—Pediatric Nurse Practitioner, Acute and Primary Care, CAGS

The Certificate of Advanced Graduate Study (CAGS) with a concentration in dual Primary/Acute Care Pediatric Nurse Practitioner (PNP) is designed for nurses who possess an MS degree in nursing. Such applicants are eligible to apply for admission to this CAGS program for advanced preparation as a PNP.

### Prerequisite Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Students should refer to the program overview page for required program prerequisites.

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Required Courses</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

### Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

## Nursing—Pediatric Nurse Practitioner, Primary Care, CAGS

The Certificate of Advanced Graduate Study (CAGS) with a concentration in Primary Care Pediatric Nurse Practitioner (PNP) is designed for nurses who possess an MS degree in nursing. Such applicants are eligible to apply for admission to this CAGS program for advanced preparation as a PNP.

### Prerequisite or Equivalent Courses

To ensure that all students have the foundation necessary to be successful in this program, each incoming student, regardless of their background, must have completed coursework in the following areas with a minimum grade of B.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	
NRSG 5126	Pathophysiology for Advanced Practice	
NRSG 6115	Health Assessment	

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Required Courses</b>		
NRSG 6262	Pediatric Pharmacology	2
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
<b>Elective</b>		
Complete 2 semester hours of graduate NRSG coursework.		2

## Program Credit/GPA Requirements

24 total semester hours required

Minimum 3.000 GPA required

### Nursing—Psychiatric-Mental Health Nurse Practitioner, CAGS

The School of Nursing offers specialized and flexible program options in psychiatric mental health nursing for nurse practitioners (NPs) with certification in another specialty. Classes are offered during the late afternoon and early evening hours to accommodate the multiple responsibilities of adult learners. This is a 24-semester-hour program of study. Upon completion of the psychiatric mental health advanced practice Certificate of Advanced Graduate Study (CAGS) program, graduates are eligible to sit for available national certification exams in their area of practice.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
NRSG 6281	Dimensions of Clinical Psychiatric Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Health	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
<b>Practicum</b>		

NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5

**Elective**

Code	Title	Hours
Complete 2 semester hours in the following subject area:		
NRSG		2

**Program Credit/GPA Requirements**

24 total semester hours required

Minimum 3.000 GPA required

**Nursing, MS**

Northeastern University's School of Nursing offers seven nurse practitioner concentrations leading to a Master of Science in Nursing. The program provides a solid foundation in research, epidemiology, health assessment, advanced pharmacology and pathophysiology, and healthcare systems with on-ground or online didactic coursework and on-ground skills and clinical experiences. The program has a strong clinical focus with high-quality clinical rotations as top priority. Students graduate prepared to practice as novice advanced-practice providers and work across a variety of healthcare settings. Graduates become nurse clinicians, educators, scholars, researchers, and lifelong learners. Upon completion of the program, graduates are eligible to sit for all national certification exams in their specialty area.

**Adult-Gerontology Acute-Care Nurse Practitioner Concentration**

The adult-gerontology acute-care concentration seeks to prepare nurses for advanced-practice roles as clinical experts, educators, and consultants. The concentration provides advanced study with a major focus on clinical experience and prepares graduates to care for patients across the continuum of care, including tertiary care, rehabilitation, and home care.

**Adult-Gerontology Primary Care Nurse Practitioner Concentration**

With a focus on health equity, the adult-gerontology primary care concentration prepares nurses to provide high-quality, ethical, and inclusive primary care to individuals 13 years and older. Graduates care for patients in a wide variety of settings.

**Family Nurse Primary Care Practitioner Concentration**

The primary goal of the FNP concentration is to educate FNPs who are capable of providing evidence-based, culturally and linguistically competent, ethical primary healthcare to individuals and families in a variety of healthcare settings. The FNP concentration is offered in a hybrid format with the majority of the classes delivered online, coupled with live presentation sessions. Students are required to be on the Boston campus twice per semester. Upon completion, graduates are eligible to sit for all national certification exams in their area of practice.

**Neonatal Nurse Practitioner Concentration**

Neonatal critical care is a growing field, and Bouvé is at the forefront of providing experienced nurses with the knowledge, competence, and skill to be in demand across the country. We require applicants to have at least two years of level-3 neonatal intensive care unit experience before entering our program, and most applicants have more years of NICU experience. A registered nurse working in the NICU setting already has a significant base of nursing knowledge. The NNP concentration focuses on advanced nursing knowledge and clinical practice. Our graduates are prepared to make independent decisions in level-2 and level-3 NICUS, drawing on their experience and diagnostic abilities to affect lives every day.

**Pediatric Nurse Practitioner Concentrations**

These concentrations are designed to prepare nurses with the specialized skills needed to care for at-risk children living in urban settings, across the continuum of care. For nearly two decades, our PNP concentration prepared primary care PNPs to provide community-based, culturally sensitive primary care. More recently, building on the School of Nursing's foundation in evidence-based, interdisciplinary, urban healthcare, the PNP curriculum was expanded to offer a concentration in acute care. Northeastern offers the only graduate nursing program in New England to prepare acute-care PNPs.

The School of Nursing offers two concentrations for the PNP student. The primary care concentration prepares students for the role of PNP focusing on well-child care and prevention and management of common acute and chronic illnesses. The acute- and primary care dual concentration prepares students for the primary care role, as well as the acute-care role. Pediatric acute-care nurse practitioners are prepared to care for patients with acute, complex, critical, and chronic illness in a variety of settings.

**Psychiatric-Mental Health Concentration**

The curriculum of the psychiatric-mental health concentration has a life span focus, with core course content covering all ages. The concentration emphasizes a biopsychosocial framework to develop the understanding of human development, etiology of psychiatric disorders, and treatment modalities geared toward working with individuals across the life span and their families. The course of study emphasizes diagnostic decision making; psychotherapeutic interventions, including individual, family, and group therapies; and psychopharmacology across the life span.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
<b>Professional</b>		
NRSG 5118	Healthcare System and Professional Role Development	3
NRSG 5121	Epidemiology and Population Health	3
<b>Clinical</b>		
NRSG 5117	Advanced Pharmacology	2
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7110	Evidence-Based Practice Research Application	2

### Concentrations and Program Credit Requirements

*A concentration is required to complete this program.*

- Adult-Gerontology Nurse Practitioner, Acute Care (p. 743)
- Adult-Gerontology Nurse Practitioner, Primary Care (p. 744)
- Family Nurse Practitioner, Primary Care (p. 744)
- Neonatal Nurse Practitioner (p. 745)
- Pediatric Nurse Practitioner, Acute and Primary Care (p. 745)
- Pediatric Nurse Practitioner, Primary Care (p. 745)
- Psychiatric-Mental Health Nurse Practitioner (p. 746)

### Program Credit/GPA Requirements

Total program hours vary based on the concentration the student chooses

Minimum 3.000 GPA required

### CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, ACUTE CARE

Code	Title	Hours
<b>Clinical</b>		
NRSG 6115	Health Assessment	3
NRSG 6222	Pharmacology of Adults and Older Adults	2
<b>Theory</b>		
NRSG 6220	Nursing Management: Acute Episodic Illness	3
NRSG 6221	Nursing Management: Critical and Chronic Illness	3
NRSG 6241	Acute-Care Concepts in Nursing Practice	3
<b>Practicum</b>		
NRSG 6420	Adult-Gerontology Acute-Care Nursing Practicum 1	2
NRSG 6421	Adult-Gerontology Acute-Care Nursing Practicum 2	4
NRSG 6422	Adult-Gerontology Acute-Care Nursing Practicum 3	4

**ELECTIVE**

Code	Title	Hours
Complete 3 semester hours in the following subject area:		3
NRSG		

**PROGRAM CREDIT REQUIREMENT**

43 total semester hours required, including program core requirements

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**CONCENTRATION IN ADULT-GERONTOLOGY NURSE PRACTITIONER, PRIMARY CARE**

Code	Title	Hours
Clinical		
NRSG 6115	Health Assessment	3
NRSG 6222	Pharmacology of Adults and Older Adults	2
Required Core		
NRSG 6249	Health Promotion of Adult/Older Adult	3
NRSG 6253	Primary Care of Adult/Older Adult Health Problems	3
NRSG 6254	Primary Care of Adult/Older Adult Complex Patients	3
Practicum		
NRSG 6449	Health Promotion of Adult/Older Adult Practicum	1
NRSG 6450	Adult/Older Adult Practicum 1	5
NRSG 6451	Adult/Older Adult Practicum 2	5

**ELECTIVE**

Code	Title	Hours
Complete 2 semester hours in the following subject area:		2
NRSG		

**PROGRAM CREDIT REQUIREMENT**

43 total semester hours required, including program core requirements

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**NURSING CONCENTRATION IN FAMILY NURSE PRACTITIONER, PRIMARY CARE**

Code	Title	Hours
Professional		
NRSG 6115	Health Assessment	3
Family		
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6392	Family Theory	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6395	Healthcare of Women in Family Practice	2
Clinical		
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6398	Prescribing Considerations in the Pediatric and Adolescent Populations	2
Practicum		
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6396	Practicum for NRSG 6395	4

**PROGRAM CREDIT REQUIREMENT**

47 total semester hours required, including program core requirements

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**CONCENTRATION IN NEONATAL NURSE PRACTITIONER**

Code	Title	Hours
<b>Clinical</b>		
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6230	Nursing Management: Critically Ill Neonatal 1	3
NRSG 6231	Nursing Management: Critically Ill Neonatal 2	3
NRSG 6232	Neonatal Pharmacology	2
<b>Practicum</b>		
NRSG 6430	Neonatal Clinical Practicum 1	4
NRSG 6431	Neonatal Clinical Practicum 2	4
NRSG 6432	Neonatal Clinical Practicum 3	2

**ELECTIVE**

Code	Title	Hours
Complete 4 semester hours at the graduate level from the following subject area:		
NRSG		4

**PROGRAM CREDIT REQUIREMENT**

41 total semester hours required, including program core requirements

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**CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, ACUTE & PRIMARY CARE**

Code	Title	Hours
<b>Clinical Core Courses</b>		
NRSG 6115	Health Assessment	3
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6262	Pediatric Pharmacology	2
<b>Clinical Theory Courses (*NRSG 6275 w/clinical component)</b>		
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6267	Care of the Critically Ill Child	3
<b>Clinical Practicum Courses</b>		
NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5
NRSG 6463	Care of the Critically Ill Child Practicum	5

**PROGRAM CREDIT REQUIREMENT**

52 total semester hours required, including program core requirements

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**CONCENTRATION IN PEDIATRIC NURSE PRACTITIONER, PRIMARY CARE**

Code	Title	Hours
<b>Clinical Core Courses</b>		
NRSG 6115	Health Assessment	3
NRSG 6262	Pediatric Pharmacology	2
<b>Clinical Theory Courses (*NRSG 6275 w/clinical component)</b>		
NRSG 6264	Care of Well Child/Adolescent Health Promotion	3
NRSG 6265	Care of Child/Adolescent Health Problems	3
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	4
<b>Clinical Practicum Courses</b>		

NRSG 6460	Pediatric NP Practicum 2	5
NRSG 6461	Pediatric NP Practicum 3	5

**PROGRAM CREDIT REQUIREMENT**

41 total semester hours required, including program core requirements

**CONCENTRATION IN PSYCHIATRIC-MENTAL HEALTH NURSE PRACTITIONER**

Code	Title	Hours
<b>Required Core</b>		
NRSG 6281	Dimensions of Clinical Psychiatric Practice	3
NRSG 6282	Clinical Psychopharmacology	3
NRSG 6283	Psychobiological Bases of Mental Health	3
NRSG 6286	Contemporary Psychotherapies—Theory and Practice	3
<b>Clinical</b>		
NRSG 6115	Health Assessment	3
<b>Practicum</b>		
NRSG 6480	Psychiatric Practicum across the Life Span 1	5
NRSG 6481	Psychiatric Practicum across the Life Span 2	5

**ELECTIVE**

Code	Title	Hours
Complete 2 semester hours in the following subject area:		
NRSG		2

**PROGRAM CREDIT REQUIREMENT**

43 total semester hours required, including program core requirements

**Nursing, MS—Direct Entry****Part I: Prelicensure**

The direct-entry nursing student enters the accelerated master's program as a graduate student. The first 16 months (four semesters) of the program consist of intensive, sequential classes and clinical with combined undergraduate- and graduate-level courses. Students are then prepared to take the National Council Licensure Exam upon completion of 64 program semester hours to earn an RN license. Students earn a Bachelor of Science in Nursing after this part of the program. Financial aid will be granted on an undergraduate basis during the prelicensure phase of the program.

**Academic Standards for Nursing Majors****ACADEMIC DISMISSAL FROM MAJOR**

Students in the Bouvé College of Health Sciences, School of Nursing, Prelicensure Nursing Major, will be dismissed from their major effective the following academic semester for any of the reasons noted below.

**Course Failure**

- Students who do not meet the required minimum grade in two professional courses, including labs and clinical, will be dismissed from the program. Only one professional course can be repeated.
- Students must retake the failed professional course as a requirement for progression in the program. This may delay your progression in the program and/or expected graduation date.
- Students who do not meet the minimum grade requirement within two attempts of the course will be dismissed from the program.

**Course Withdrawal**

- Only two professional course withdrawals will be permitted (excluding a medical leave of absence). Additional professional course withdrawals may lead to dismissal from the program.
- A withdrawal from a didactic and associated clinical/lab course will count as one course withdrawal.

- Students who have withdrawn from two professional courses will receive individual outreach support, which includes a mandatory meeting with both your advisor and your program director (and/or assistant undergraduate dean).
- Personal leaves of absence will be considered on an individual basis.

See Academic Appeals Policies and Procedures (p. 185)

### **ACADEMIC APPEALS**

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/appeals-process/>) and the Northeastern University Academic Appeals Policies and Procedures (p. 185).

### **Program Policies and Standards**

Students are expected to adhere to the policies and standards of their program major to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major will present their petitions before the School of Nursing Academic Standing Committee.

Students are required to attend all scheduled nursing classes, clinical experiences, and clinical labs on campus and in clinical agencies. If the student fails to meet attendance requirements, the student will fail the associated class, clinical, and/or lab.

### **CLINICAL REQUIREMENTS**

Clinical settings require a criminal background check.

All students must receive a health clearance from University Health and Counseling Services. Health clearance is based on specific documentation of immunity from infectious disease and a physical examination. (This may be done by the student's own healthcare provider.) In addition, nursing students need a clinical clearance in order to participate in clinical courses. Clinical clearance, managed by the School of Nursing's Clinical Placement Office, includes verification of certification in cardiopulmonary resuscitation; recent negative tuberculosis screening; positive titers for MMR, varicella, and hepatitis B; vaccines including TDAP and influenza; and additional health screenings as may be required by the program. It is the responsibility of the student to stay current and to provide documentation required for clinical clearance throughout the entire nursing program.

Six weeks prior to the start of a clinical course, students must show the following to be eligible for clinical placement:

- Evidence of immunizations and health clearance by UHCS
- Documentation of CPR certification
- Completion of a Criminal Offender Record Information background check

*Students will not be allowed to start the clinical course, and may be dropped from the clinical course, if these processes are not satisfactorily completed.*

Students should refer to Requirements for Clinical, Internships, and Practicum Courses (p. 640) in this catalog (applicable to both undergraduate students and graduate students at the college) for additional details.

### ***Clinical Warning***

A nursing student may be placed on clinical warning, or fail the clinical course, at any time during the semester for the following reasons:

- Failing to meet the clinical objectives at a satisfactory level.
- Failing to demonstrate safe practice. Students may be removed from the clinical area, before completion of the clinical rotation, if the instructor determines that the student is unsafe. This will result in the student failing the clinical course.
- Failing to meet the attendance requirement.

### ***Conditions***

- Students on clinical warning must develop an academic plan with the clinical instructor to address clinical performance.
- Students will be expected to improve clinical performance by adhering to the plan.
- Failure to adhere to the terms of the plan will result in the student failing the course and being placed on academic probation. All conditions of academic probation will then apply.

### ***Notification***

- The clinical instructor will issue the student a clinical warning via the Faculty and Advisor Communication Tool identifying the problem.
- The student and the instructor should then develop a plan together to address the deficiency.
- Copies of the warning will be forwarded to the program director and/or the assistant dean for undergraduate programs if needed.
- This is an administrative warning and will not be posted on the transcript.
- Satisfactory completion of the clinical experience component of the course will result in removal of the warning from the student's file.

### **BLOODBORNE PATHOGEN EXPOSURE AND INJURY**

Any student who sustains any kind of injury and/or exposure related to blood-borne, respiratory, or other pathogens or hazardous materials while on a clinical rotation should seek immediate treatment. They must also immediately follow the procedures listed below.

### **Procedures**

- Students must follow the affiliate site's protocol for exposure reporting, testing, counseling, and follow-up.
- Students can present their Clinical Accident Insurance identification card (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/General%20Resources/Forms/AllItems.aspx?id=%2Fsites%2FBouveCurrentStudentResources%2FGeneral%20Resources%2FAccident%20Insurance%2FNortheastern%20University%20Insurance%20Card%2Epdf&parent=%2Fsites%2FBouveCurrentStudentResources%2FGeneral%20Resources%2FAccident%20Insurance>) to arrange billing at the site or a suitable nearby hospital or urgent care clinic. If students do not know a local provider, they can call the resource number on their identification card for aid in finding a local provider. Students should also present their personal health insurance information.
- Within 24 hours of the accident, students must also inform their program's director of clinical education (or unit designee responsible for clinical placements) of the accident and submit, in writing, a description of the incident and injury or exposure using the BCHS Clinical Accident Report Form, linked here (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/SitePages/Clinical-Accident-Report-Form.aspx>). *If a student is incapacitated and unable to file their own report within the 24-hour time frame, a Northeastern faculty or staff person familiar with the incident may file on their behalf. The student should file their own report as soon as possible thereafter.*
- Submission of the Accident Report form linked above will automatically notify:
  - The program's director of clinical education or Clinical Placement Office (or unit designee responsible for clinical placements)
  - The program director (if applicable)
  - Assistant dean of clinical education in the BCHS Dean's Office
  - Risk Services (risk@northeastern.edu) (risk@northeastern.edu)
  - If exposure involved, Office of Environmental Health and Safety—Biosafety
- If for any reason a student is not able to receive immediate medical treatment, there is the resource of postexposure counseling through the university's partner, Occupational & Environmental Health Network. They can be reached at 1-866-360-8100. OEHN is open 24 hours a day, 7 days a week, 365 days a year. OEHN will collect appropriate information and engage the doctor on call who can help to direct appropriate care depending on exposure and circumstances.

### **Technical Standards for Admission, Academic Progression, and Graduation**

The primary mission of the School of Nursing is to educate our students to provide evidence-based, culturally and linguistically competent, ethical healthcare that is high quality, safe, and accessible to diverse local, national, and global communities. Our programs are designed to prepare students to become leaders as nurse clinicians, educators, scholars, and researchers. The School of Nursing is also committed to achieving the goals of the university to become an outstanding national research, practice-oriented, student-centered, urban institution.

The goal of the School of Nursing is to prepare students to think critically and to practice nursing competently and compassionately in rapidly changing practice environments. All efforts are designed to build nursing knowledge; enhance nursing practice and patient safety; foster professional integrity; and ultimately improve the health outcomes of patients, families, and communities across the continuum of care.

In addition to classroom learning, students' clinical education experiences occur in settings, like hospitals, in which patient safety is the priority. For this reason, students who, upon enrollment in any of the nursing programs, seek accommodations from Disability Access Services at Northeastern must also request an assessment of accommodations that would be needed for clinical education.

Certain functional abilities are essential for the delivery of safe, effective nursing care during clinical education activities. Therefore, the School of Nursing has determined that certain technical standards are requisite for admission, progression, and graduation from the nursing programs. An individual must be able to independently, with or without reasonable accommodation, meet the following technical standards:

1. General abilities (p. 748)
2. Observational ability (p. 748)
3. Communication ability (p. 749)
4. Motor ability (p. 749)
5. Intellectual, conceptual, and quantitative abilities (p. 749)
6. Essential behavioral and social attributes (p. 749)
7. Ability to manage stressful situations (p. 749)

Individuals unable to meet these technical standards, with or without reasonable accommodation, will not be able to complete the program.

### **GENERAL ABILITIES**

The student is expected to possess functional use of the senses of vision, touch, hearing, and smell so that data received by the senses may be integrated, analyzed, and synthesized in a consistent and accurate manner. A student must be able to respond promptly to urgent situations that may occur during clinical training activities and must not hinder the ability of other members of the healthcare team to provide prompt treatment and care to patients.

### **OBSERVATIONAL ABILITY**

The student must have sufficient capacity to make accurate visual observations and interpret them in the context of laboratory studies, medication administration, and patient care activities. In addition, the student must be able to document these observations and maintain accurate records.

**COMMUNICATION ABILITY**

The student must communicate both verbally and nonverbally in order to elicit information and to convey that information to others. Each student must have the ability to read and write accurately and comprehensively in English. The student must be able to thoroughly comprehend and fluently speak the English language so as to facilitate communication with patients, families, professionals in healthcare settings, instructors, and other students. The student must also be able to present information in a professional, logical manner and to provide counseling and instruction in order to effectively care for patients and their families.

**MOTOR ABILITY**

The student must be able to perform gross and fine motor movements with sufficient coordination needed to perform complete physical examinations utilizing the techniques of inspection, palpation, percussion, auscultation, and other diagnostic maneuvers. A student must develop the skills needed to perform or assist with procedures, treatments, administration of medication, and the management and operation of diagnostic and therapeutic medical equipment. The student must possess the physical and mental stamina to meet the demands associated with extended periods of sitting, standing, moving, and physical exertion required for satisfactory and safe performance in the clinical and classroom settings.

**INTELLECTUAL, CONCEPTUAL, AND QUANTITATIVE ABILITIES**

The student must be able to develop and refine critical thinking skills that are essential to nursing practice. Critical thinking involves the abilities to measure, calculate, reason, analyze, and synthesize objective and subjective data and to make decisions, often in a time-urgent environment, that reflect consistent and thoughtful deliberation and sound clinical judgment.

**ESSENTIAL BEHAVIORAL AND SOCIAL ATTRIBUTES**

Compassion, integrity, motivation, effective interpersonal skills, and concern for others are personal attributes required of those in the nursing programs. The student must be able to work under supervision of a clinical instructor or preceptor; this is essential to ensure patient safety. The student must exercise good judgment and promptly complete all responsibilities in the classroom and clinical settings. The ability to establish culturally competent relationships with individuals, families, and groups and to respond effectively to patients who have different intellectual capacities is critical to nursing practice.

**ABILITY TO MANAGE STRESSFUL SITUATIONS**

The student must be able to adapt to and function effectively in stressful situations in both the classroom and clinical settings, including emergency situations. These stressors include personal, patient care/family, faculty/peer, and/or program-related issues.

**Disability and Special Needs**

Students with special needs are encouraged to contact the DAS (<https://drc.sites.northeastern.edu/>) to register and request services. Students must notify the instructor at the beginning of the semester if they plan to use DAS services throughout the course. The staff in that office is available for assistance.

**State Board Nursing Examination**

In Massachusetts, and several other states, the registering board requires that graduates taking the National Council Licensing Examination meet standards of "good moral character." Students may review the GMC requirement specified at Massachusetts General Laws Chapter 112, sections 74, 74A, and 76; Licensure Policy No. 00-01 under "Rules & Regulations" on the Massachusetts BORN website.

**RN Work Experience**

Once a student graduates with a BSN, they are required to participate in an online professional seminar for two semesters prior to progressing into their master's coursework. In addition, students seek full-time RN experience, which is also required for progression into the master's clinical practicums in their concentration. One to two years of RN work experience is required, depending on the concentration. Students may begin the master's core courses during the required one to two years of RN experience, with approval from the specialty concentration director. Finding RN employment is the responsibility of the student, as it is professional nursing experience. Northeastern will help support the student in preparation for the job search. The student may take no more than 12 months' leave of absence between the licensure and MS phases of the Direct-Entry program. Please see MS Nursing (p. 742) for more information about the master's phase of the Direct-Entry program.

**Part II: Return to Master's Specialty Tracks**

In the master's program, students are required to take professional, research, and clinical core courses, as well as clinical courses specific to their concentration. Full- or part-time academic study is available to students. Most students return to the master's segment of the program taking coursework as a part-time student while continuing to work and increasing the amount of professional RN experience accrued. Completion of the master's degree can take four to six semesters, depending on the student's program plan and concentration. Upon completion of the requirements for their concentration, the student receives a Master of Science degree and is eligible to take the national certification exam in their area of advanced nursing practice. Financial aid is awarded on a graduate basis during this portion of the program.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

A grade of B or better in the BSN clinical courses is highly recommended for progression into the MSN portion of the program. Progression is at the graduate specialty director's discretion.

Students must successfully complete all courses with a grade of C or better except where otherwise indicated.

Code	Title	Hours
<b>Semester 1</b>		
NRSG 2220 and NRSG 2221	Health Assessment and Fundamental Nursing Skills and Lab for NRSG 2220	4
NRSG 3302 and NRSG 3303	Nursing with Women and Families and Clinical for NRSG 3302	5
<i>A grade of B or higher is required in NRSG 5117.</i>		
NRSG 5117	Advanced Pharmacology	2
<i>A grade of B or higher is required in NRSG 5126.</i>		
NRSG 5126	Pathophysiology for Advanced Practice	3
<b>Semester 2</b>		
NRSG 2210	Influences on Health and Illness: A Nursing Perspective	3
NRSG 3320 and NRSG 3321	Nursing Care of Adults 1 and Clinical for NRSG 3320	6
NRSG 3323 and NRSG 3324	Advanced Assessment and Interventions and Lab for NRSG 3323	2
NRSG 3400 and NRSG 3401	Nursing and the Promotion of Mental Health and Clinical for NRSG 3400	5
<b>Semester 3</b>		
NRSG 3420 and NRSG 3421	Nursing Care of Adults 2 and Clinical for NRSG 3420	6
NRSG 4502 and NRSG 4503	Nursing Care of the Child and Clinical for NRSG 4502	6
NRSG 5220	Introduction to Research Methods and Application for Healthcare	4
<b>Semester 4</b>		
NRSG 2150	Ethical Healthcare: Genetics and Genomics	4
NRSG 4604 and NRSG 4605	Public Health Community Nursing and Clinical for NRSG 4604	5
NRSG 4610	Managing and Leading in Healthcare	4
NRSG 4995 and NRSG 4996	Comprehensive Nursing Practicum and Clinical for NRSG 4995	5

### **Academic Progression Standards for Nursing Majors**

- Students who either fail or withdraw from a professional course will need to successfully remediate that course before continuing in their approved curriculum plan.
- Students who incur an incomplete grade in a prerequisite course must obtain approval from their academic advisor, upon consultation with the department faculty and, when appropriate, the School of Nursing Academic Standing Committee, prior to progression into the subsequent course(s).
- Students may not change their graduation date more than twice.

### **Program Credit / GPA Requirements**

64 total semester hours required

Minimum 3.000 GPA required

## Nursing Leadership, MS

The MS in Nursing Leadership program prepares future nurse leaders by integrating advanced evidence-based clinical practice, interdisciplinary collaboration, healthcare innovation, fiscal responsibility, and principles of leadership with a concentration in the areas of postsecondary teaching, nurse executive, or patient safety. The program provides theoretical content and experiential learning in diverse healthcare environments to examine healthcare services and quality, organizational systems analysis, fiscal responsibility, and strategies for student and peer evaluation and mentorship. Upon completion of the chosen concentration, students will be eligible to sit for national certification in their area of specialty: American Nurses Association Credentialing Center, providing certification as a Nurse Executive-Board Certified (NE-BC); National League for Nursing, providing certification as a Certified Academic Clinical Nurse Educator (CNEcl); and/or the Institute for Healthcare Improvement, providing certification as a Certified Professional in Patient Safety (CPPS).

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	2
NRSG 5121	Epidemiology and Population Health	3
NRSG 5126	Pathophysiology for Advanced Practice	3
NRSG 6115	Health Assessment	3
NRSG 6300	Healthcare Finance and Marketing	3
NRSG 6302	Health Policy and Law	3
NRSG 6306	Health Informatics	3
NRSG 7100	Leadership in Advanced Practice Nursing	3
NRSG 7105	Translating Research Evidence into Practice	3
NRSG 7500	Role/Practice Issues in Nurse Anesthesia	3
NRSG 7911	DNP Project Immersion 1	1
NRSG 7920	The Steps to Practice Inquiry: Analyze, Evaluate, Synthesize, and Apply the Evidence	3
NRSG 7926	Applied Data Management	2

### Concentrations and Program Credit Requirements

A concentration is required to complete this program.

- Nurse Executive (p. 751)
- Patient Safety (p. 752)
- Postsecondary Teaching (p. 752)

### Program Credit/GPA Requirements

Total program hours vary based on the concentration the student chooses

Minimum 3.000 GPA required

#### CONCENTRATION IN NURSE EXECUTIVE

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
MSCI 6001	Principles of Healthcare Advocacy	3

MSCI 6003	Healthcare Leadership Seminar	3
NRSG 7990	Thesis	3
PHTH 6204	Society, Behavior, and Health	3

**PROGRAM CREDIT REQUIREMENT**

53 total semester hours required, including program core requirements

**CONCENTRATION IN PATIENT SAFETY**

Note: A student enrolled in this concentration may not also earn the Graduate Certificate in Patient Safety.

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3
HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

**PROGRAM CREDIT REQUIREMENT**

47 total semester hours required, including program core requirements

**CONCENTRATION IN POSTSECONDARY TEACHING**

Note: A student enrolled in this concentration may not also earn the Graduate Certificate in Postsecondary Teaching.

Code	Title	Hours
INPR 5100	Foundations of Evidence-based Postsecondary Teaching	4
INPR 5110	Integrating Teaching Across Contexts	4
INPR 5120	Postsecondary Teaching Practicum	4

**PROGRAM CREDIT REQUIREMENT**

47 total semester hours required, including program core requirements

**Patient Safety, Graduate Certificate****Overview**

The Graduate Certificate in Patient Safety informs and empowers the next generations of innovative patient safety experts by providing the knowledge and practical skills to promote a culture of safety and design safer systems of care. Future leaders incorporate clinician wellness strategies in care delivery models that are accountable, honest, and transparent. The purpose of this certificate is to support healthcare clinicians and leaders in advancing patient safety and the safety of healthcare providers by expanding their fundamental skills and knowledge in patient safety science principles, workforce wellness, and quality improvement strategies.

This is a four-course, interdisciplinary graduate certificate, tailored to accommodate a busy healthcare professional's schedule. Courses are delivered in an online format, structured to enhance the curriculum with peer-to-peer discussions and experience developing tools, protocols, and process improvement strategies.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

A grade of B or higher is required in each course.

Code	Title	Hours
HLTH 5600	Introduction to Patient Safety	3
HLTH 5610	Patient Safety Science	3

HLTH 5620	Leadership, Patient Safety, and Clinician Wellness	3
HLTH 5630	Quality Improvement in Patient Safety	3

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.00 GPA required

### Pediatric Nurse Practitioner, Acute Care, Graduate Certificate

The post-master's acute-care PNP 16-credit graduate certificate for PNPs or FNPs certified in primary care seeking pediatric specialization in acute care is open to PNPs or FNPs certified in primary care with a master's or doctoral degree from an accredited institution. Graduates are eligible to sit for the acute-care PNP certification board exam.

## Prerequisite Requirements

To ensure that all students have the foundation necessary to participate in this program, successful completion of the following courses or their equivalent within the past five years is required. Alternatively, active PNP/FNP experience with primary care PNP competencies (one-year minimum full-time pediatric experience) is required.

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 5117	Advanced Pharmacology	
NRSG 5126	Pathophysiology for Advanced Practice	
NRSG 6115	Health Assessment	
NRSG 6262	Pediatric Pharmacology	
NRSG 6265	Care of Child/Adolescent Health Problems	
NRSG 6275	Health Promotion and Preventative Care in Pediatrics in the Context of Community Health	

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 6116	Advanced Health Assessment of the Neonate and Infant	3
NRSG 6267	Care of the Critically Ill Child	3
NRSG 6461	Pediatric NP Practicum 3 <sup>1</sup>	5
NRSG 6463	Care of the Critically Ill Child Practicum <sup>1</sup>	5

<sup>1</sup> Direct clinical hours included

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Primary Care Nursing FNP, Graduate Certificate

The Northeastern University Family Nurse Practitioner graduate certificate is designed to prepare Advanced Practice Registered Nurses who have completed a master's degree and certification in another APRN specialty to be eligible to obtain national certification (AACN or AANP) as a Family Nurse Practitioner. FNPs provide healthcare services across the life span and in a variety of settings including, but not limited to, neighborhood centers, private practice, school-based clinics, in the home, long-term care facilities, and hospice.

### **Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

A grade of B or higher is required in each course.

Code	Title	Hours
NRSG 6392	Family Theory	2
NRSG 6561	Advanced Nurse Practitioner Clinical Intensive	1

### **Options**

- For Licensed Pediatric Nurse Practitioners/Pediatric Clinical Nurse Specialists (p. 754)
- For Licensed Nurse Midwives (p. 754)
- For Licensed Adult/Gerontology Primary Nurse Practitioners/CNS Adult (p. 755)
- For Licensed Adult/Gerontology Acute Care Nurse Practitioners/Adult/Acute Clinical Nurse Specialists (p. 755)
- For Licensed Psychiatric Mental Health Nurse Practitioners/PMH Clinical Nurse Specialists (p. 755)
- For Licensed Neonatal Nurse Practitioners (p. 755)
- For Licensed Nurse Anesthetists (p. 755)

### **Program Credit/GPA Requirements**

19–29 total semester hours required

Minimum 3.000 GPA required

### **OPTION FOR LICENSED PEDIATRIC NURSE PRACTITIONERS/PEDIATRIC CLINICAL NURSE SPECIALISTS**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Pediatric Nurse Practitioners/Pediatric Clinical Nurse Specialists must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults (Total Program Hours)	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

### **OPTION FOR LICENSED NURSE MIDWIVES**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Nurse Midwives must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4

**OPTION FOR LICENSED ADULT/GERONTOLOGY PRIMARY NURSE PRACTITIONERS/CNS ADULT**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Adult/Gerontology Primary Nurse Practitioners/CNS Adult students must complete the following:

Code	Title	Hours
NRSG 6262	Pediatric Pharmacology	2
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

**OPTION FOR LICENSED ADULT/GERONTOLOGY ACUTE CARE NURSE PRACTITIONERS/ADULT/ACUTE CLINICAL NURSE SPECIALISTS**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Adult/Gerontology Acute Care Nurse Practitioners/Adult/Acute Clinical Nurse Specialists must complete the following:

Code	Title	Hours
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

**OPTION FOR LICENSED PSYCHIATRIC MENTAL HEALTH NURSE PRACTITIONERS/PMH CLINICAL NURSE SPECIALISTS**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Psychiatric Mental Health Nurse Practitioners/PMH Clinical Nurse Specialists must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

**OPTION FOR LICENSED NEONATAL NURSE PRACTITIONERS**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Neonatal Nurse Practitioners must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4
NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

**OPTION FOR LICENSED NURSE ANESTHETISTS**

In addition to Family Theory (NRSG 6392) and Advanced Nurse Practitioner Clinical Intensive (NRSG 6561), Licensed Nurse Anesthetists must complete the following:

Code	Title	Hours
NRSG 6222	Pharmacology of Adults and Older Adults	2
NRSG 6262	Pediatric Pharmacology	2
NRSG 6390	Family Care of the Adult/Older Adult Patient	4

NRSG 6391	Practicum for NRSG 6390	4
NRSG 6393	Family Care of the Pediatric and Adolescent Patient	4
NRSG 6394	Practicum for NRSG 6393	4
NRSG 6395	Healthcare of Women in Family Practice	2
NRSG 6396	Practicum for NRSG 6395	4

## School of Pharmacy and Pharmaceutical Sciences

Website (<http://www.northeastern.edu/bouve/pharmacy/>)

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The School of Pharmacy and Pharmaceutical Sciences provides transformative learning and research experiences in a collaborative and diverse environment to develop leaders who positively impact the health and well-being across the life span of those we serve.

SOPPS will be the model for excellence and innovation in pharmacy and pharmaceutical sciences education that is grounded in experiential learning and enhances the health of communities through research and practice.

## Programs

### Doctor of Philosophy (PhD)

- Biomedical Science (p. 756)
- Medicinal Chemistry and Drug Discovery (p. 763)
- Pharmaceutics and Drug Delivery (p. 770)
- Pharmacology (p. 775)

### Doctor of Pharmacy (PharmD)

- Doctor of Pharmacy (p. 781)
- Doctor of Pharmacy—Direct Entry (p. 782)

### Master of Science (MS)

- Biomedical Science (p. 788)
- Medicinal Chemistry and Drug Discovery (p. 791)
- Pharmaceutical Engineering (p. 433)
- Pharmaceutics and Drug Delivery (p. 796)
- Pharmacology (p. 799)

### Dual Degree

- Pharmacy, PharmD—Direct Entry/Public Health, MPH (p. 662)

## Biomedical Science, PhD

The Department of Pharmaceutical Sciences offers a PhD program in biomedical science that focuses on the cross-disciplinary integration of human (patho)biology with drug action, invention, and clinical utility. The biomedical sciences curriculum involves coursework and original research in areas including drug design and profiling, toxicology, and pharmaceutical biochemistry/cell biology aimed at increasing our understanding of how unsolved medical needs may be addressed by novel therapeutic approaches. The biomedical science program is appropriate for those entering the field as well as persons currently employed as research technicians, clinical laboratory workers, and science teachers/administrators. The flexibility of the biomedical science program and its interdisciplinary nature can enhance job performance in a present position and invite new employment opportunities.

## Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

## Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

## Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
4. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services (<https://international.northeastern.edu/ogs/>) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
5. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
6. Taking internship must not extend international students' visas.
7. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the Universitywide Academic Policies and Procedures (p. 154) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 629).

## Milestones

### QUALIFYING EXAMINATION

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry and drug discovery, biomedical sciences, and pharmaceutics and drug delivery. Students from each of the four programs will take the exams within the same time frame (below), regardless of specialty-area program focus.

Doctoral students should have selected a dissertation advisor by the end of their first year in the program and are expected to have begun research and demonstrated initial proficiency in the laboratory before taking the PhD qualifying examination.

The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

At least two departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

- **Written exam 1** reflects students' knowledge of their specialty-area program material and of overall pharmaceutical sciences. This exam is given on the same day in two parts. Part 1 is focused on each student's specialty-area program focus. Part 2 will test students' overall knowledge in another program focus covered by the pharmaceutical sciences curriculum.
  - For example, if the student is in the pharmaceutics and drug delivery PhD program, part 1 will be about pharmaceutics and drug delivery, and part 2 can focus either on pharmacology or medicinal chemistry and drug discovery.

- **Written exam 2** requires that students write an NIH F31 grant proposal and have the proposal signed off as passing by their examination committee after an oral defense.

A score of at least 70% is required to pass the first written exam (two parts). Students must pass all written portions of the PhD qualifying examination prior to the oral defense of the F31 proposal. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails the first exam twice will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of, minimally, four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee as the student's dissertation committee.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed two months from the first oral exam. Those who fail twice will be dismissed from the program.

### DOCTORAL CANDIDACY STATUS

Doctoral students who have completed satisfactorily and thereby earned the credits for all required core courses (including those for their specialized area) and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

### DOCTORAL DISSERTATION COMMITTEE

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the Doctoral Dissertation Committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the Doctoral Dissertation Committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

### DISSERTATION PROPOSAL DEFENSE

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the third year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as a failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal. Associated required forms may be found on the SOPPS Student Portal Canvas site.

The dissertation proposal must be defended orally before the student's dissertation committee and signed by all dissertation committee members in *approval of the student's planned dissertation research*. Upon dissertation approval, the copies of the signed proposal approval cover sheet (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/Current%20Student%20Forms%20Document%20Library/Forms/AllItems.aspx?id=%2Fsites%2FBouveCurrentStudentResources%2FCurrent%20Student%20Forms%20Document%20Library%2FPhD%20Forms%2FDissertation%20Proposal%20Approval%20Form%2Epdf&parent=%2Fsites%2FBouveCurrentStudentResources%2FCurrent%20Student%20Forms%20Document%20Library%2FPhD%20Forms>) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

### BIANNUAL REVIEW

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see instructions listed on the SOPPS Student Portal Canvas site). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

### ***Registration for Dissertation***

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. The department strongly encourages PhD students to complete the program within five years after acceptance, i.e., by three years after establishing degree candidacy. According to university policy, no PhD students may remain in the program for more than seven years.

### **Publications and Presentations**

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

### **PhD Dissertation Preparation**

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

### **PHARMACEUTICAL SCIENCES COLLOQUIUM**

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

### **ORAL DISSERTATION DEFENSE**

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

### **Deadline**

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

### **SOPPS PROFESSIONAL CODE OF CONDUCT**

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Qualifying examination

Doctoral candidacy status

Doctoral dissertation committee  
 Dissertation proposal  
 Biannual review  
 Pharmaceutical Sciences Colloquium  
 Oral dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following repeatable course for six semesters:		
PHSC 6300	Pharmaceutical Science Seminar	6
<b>Required Core</b>		
Complete the following:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2

## Electives

Code	Title	Hours
Students must complete one course from each of the following specialization areas for a total of three courses:		
<b>Pharmaceutics &amp; Drug Delivery</b>		
Complete one of the following:		
PMST 6250	Advanced Physical Pharmacy	
PMST 6252	Pharmacokinetics and Drug Metabolism	
PMST 6254	Advanced Drug Delivery Systems	
<b>Pharmacology</b>		
Complete one of the following:		
PMCL 6250	Ion Channel Physiology and Pharmacology	
PMCL 6252	Small-Molecule Target and Ligand Pharmacology	
<b>Medicinal Chemistry &amp; Drug Discovery</b>		
Complete one of the following:		
CHEM 5626	Organic Synthesis 1	
CHEM 5628	Principles of Spectroscopy of Organic Compounds	
PHSC 5450	Contemporary Approaches to Drug Design	

## Research and Dissertation

Code	Title	Hours
<b>Prequalifying Exam Course</b>		
PHSC 7020	Scientific Writing: Thesis Proposal	2
<b>Qualifying Exam</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Program Credit/GPA Requirements

31 - 33 total semester hours required

Minimum 3.000 GPA required

## Plan of Study (Standard Program)

### Sample Plan

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 5212		2 PHSC 7020 <sup>1</sup>	2
PHSC 5100		2 PHSC 6214		2	
PHSC 5102		2 PHSC 6300		1	
During the first year of courses, students must complete one course for each specialization:		3-6 During the first year of courses, students must complete one course for each specialization:		2-7	
Available in Fall semester:		Available in Spring semester:			
Pharmaceutics & Drug Delivery:		Pharmaceutics & Drug Delivery:			
PMST 6254		PMST 6250 or 6252			
Pharmacology:		Pharmacology:			
PMCL 6250		PMCL 6252			
Medicinal Chemistry & Drug Discovery:		Medicinal Chemistry & Drug Discovery:			
CHEM 5626 or 5628		PHSC 5450			
	10-11			8-12	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>2</sup>	2
PHSC 8940		1 PHSC 8986		0	
	2			1	2
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
	1			1	0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5305 <sup>4</sup>		1 PHSC 6213 <sup>4</sup>		2 PHSC 9996	0
PHSC 6810 <sup>3</sup>		1 PHSC 9996		0	
	2			2	0

Total Hours: 31-36

<sup>1</sup> Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.

<sup>2</sup> Doctoral Proposal (PHSC 9681) should be taken in summer of second year, but no later than fall of third year.

<sup>3</sup> Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

<sup>4</sup> PHSC 5305 & PHSC 6213 is suggested to be taken in the fourth year, but can be taken at any point before graduation.

## Sample Plan of Study - Advanced Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>1</sup>	2
PHSC 8940		1 PHSC 8986 or 9681 <sup>1</sup>		0	
	2			1	2

<b>Year 2</b>					
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer Full Semester</b>	<b>Hours</b>
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0

  

<b>Year 3</b>					
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	<b>Summer Full Semester</b>	<b>Hours</b>
PHSC 6810 <sup>2</sup>		1 PHSC 6213		2	
		PHSC 9996		0	
		1		2	

**Total Hours: 10**

- 1 Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of the first year but must be taken before fall of the second year.
- 2 Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before the dissertation defense.

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Advanced entry into the PhD program in biomedical science requires a master's degree in pharmaceutical sciences or a related area and focuses on various advanced research courses, and successful defense of the dissertation. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying examination  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Required</b>		
PHSC 6213	Ethical Problems in Health Sciences Research	2
<b>Seminar</b>		
Complete the following repeatable course four times:		4
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Research and Dissertation

<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2

**Dissertation**

PHSC 9990	Dissertation Term 1
PHSC 9991	Dissertation Term 2

**Program Credit/GPA Requirements**

10 total semester hours required

Minimum 3.000 GPA required

**Plan of Study (Advanced Entry)****Sample Plan of Study - Advanced Entry**

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>1</sup>	2
PHSC 8940		1 PHSC 8986 or 9681 <sup>1</sup>		0	
		2		1	2

  

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
	1			1	0

  

Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6810 <sup>2</sup>		1 PHSC 6213		2	
		PHSC 9996		0	
	1			2	

**Total Hours: 10**

<sup>1</sup> Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of the first year but must be taken before fall of the second year.

<sup>2</sup> Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before the dissertation defense.

**Medicinal Chemistry and Drug Discovery, PhD**

The PhD Program in Medicinal Chemistry and Drug Discovery educates and trains students in the design and synthesis of novel, biologically active compounds and in delineating their mechanisms of action using biochemical, biophysical, and pharmacological approaches. Research specializations are available in synthetic, biochemical/pharmacological, and biophysical aspects of medicinal chemistry. Doctoral research in these specializations will relate to faculty areas of research, which currently include substance use disorders and addiction; neuropathic pain; obesity and metabolic disorders; neuropsychiatric disorders (psychoses, ADHD, depression, anxiety, eating disorders); and neurodegenerative diseases.

**Journal Club Participation**

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Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

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1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
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The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

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The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

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Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

### ***PhD Dissertation Preparation***

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

### **PHARMACEUTICAL SCIENCES COLLOQUIUM**

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

### **ORAL DISSERTATION DEFENSE**

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

#### **Deadline**

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

### **SOPPS PROFESSIONAL CODE OF CONDUCT**

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Qualifying examination  
Doctoral candidacy status  
Doctoral dissertation committee  
Dissertation proposal  
Biannual review  
Pharmaceutical Sciences Colloquium  
Oral dissertation defense

### **Core Requirements**

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following repeatable course for six semesters:		6
PHSC 6300	Pharmaceutical Science Seminar	
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
<b>Medicinal Chemistry and Drug Discovery</b>		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
PHSC 5450	Contemporary Approaches to Drug Design	3

## Research and Dissertation

Code	Title	Hours
<b>Pre-Qualifying Exam Course</b>		
PHSC 7020	Scientific Writing: Thesis Proposal	2
<b>Qualifying Exam</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Plan of Study (Standard Program)

### Plan of Study

<b>Year 1</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
CHEM 5626		3 PHSC 5212		2 PHSC 7020 <sup>1</sup>	2
CHEM 5628		3 PHSC 5450		3	
PHSC 5100		2 PHSC 6214		2	
PHSC 5102		2 PHSC 6300		1	
PHSC 6300		1			
		11		8	2
<b>Year 2</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>2</sup>	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2
<b>Year 3</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0

<b>Year 4</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5305 <sup>4</sup>		1 PHSC 6213 <sup>4</sup>		2 PHSC 9996	0
PHSC 6810 <sup>3</sup>		1 PHSC 9996		0	
	2		2		0

**Total Hours: 32**

- 1 Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
- 2 Doctoral Proposal (PHSC 9681) should be taken in summer of second year, but no later than fall of third year.
- 3 Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.
- 4 PHSC 5305 & PHSC 6213 is suggested to be taken in the fourth year, but can be taken at any point before graduation.

## Plan of Study - Advanced Entry

<b>Year 1</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>1</sup>	2
PHSC 8940		1 PHSC 8986 or 9681 <sup>1</sup>		0	
	2		1		2

  

<b>Year 2</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
	1		1		0

  

<b>Year 3</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6810 <sup>2</sup>		1 PHSC 6213		2	
		PHSC 9996		0	
	1		2		

**Total Hours: 10**

- 1 Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.
- 2 Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Advanced entry into the Medicinal Chemistry and Drug Discovery PhD program requires a master's degree in pharmaceutical sciences or a related area and focuses on various advanced research courses and successful defense of the dissertation. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

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Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

- Annual review  
Qualifying examination

Dissertation committee  
 Dissertation proposal  
 Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required</b>		
PHSC 6213	Ethical Problems in Health Sciences Research	2
<b>Seminar</b>		
Complete the following repeatable course four times:		4
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Research and Dissertation

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

## Plan of Study (Advanced Entry)

### Plan of Study - Advanced Entry

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>1</sup>	2
PHSC 8940		1 PHSC 8986 or 9681 <sup>1</sup>		0	
		2		1	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0
Year 3					
Fall	Hours	Spring	Hours		
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<sup>2</sup> Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

## Pharmaceutics and Drug Delivery, PhD

Students studying pharmaceutics and drug delivery will be thoroughly exposed to the fundamentals of physical pharmacy and pharmaceutics and trained in several specialized areas including:

- Novel drug delivery systems
- Nanomedical technologies
- Biopharmaceutics and pharmacokinetics

With exposure to these facets of the pharmaceutical sciences, successful graduates are poised to understand and assimilate the field of modern pharmaceutics. A PhD degree in pharmaceutics is a research degree. While coursework plays an important role, students become active participants in the science of pharmaceutics in the laboratory. Faculty research in pharmaceutical sciences covers a broad range of scientific interests, including pharmacokinetic toxicodynamics of anticancer agents; use of novel biomaterials and synthetic polymeric systems in designing small-molecule drug delivery systems for small molecules, proteins, and nucleic acids; passive and active targeting of therapeutic agents for cancer and cardiovascular diseases; novel delivery systems for immunostimulating purposes; and mathematical modeling of endogenous compounds.

### Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar (PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

### Colloquium Attendance

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

### Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
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Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

### ***PhD Dissertation Preparation***

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

### ***PHARMACEUTICAL SCIENCES COLLOQUIUM***

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

### ***ORAL DISSERTATION DEFENSE***

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

### ***Deadline***

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

### ***SOPPS PROFESSIONAL CODE OF CONDUCT***

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination  
Doctoral candidacy status  
Doctoral dissertation committee  
Dissertation proposal  
Biannual review  
Pharmaceutical Science Colloquium  
Oral dissertation defense

### Core Requirements

Code	Title	Hours
<b>Seminar</b>		
PHSC 6300	Pharmaceutical Science Seminar	6
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
<b>Pharmaceutics</b>		
PMST 6250	Advanced Physical Pharmacy	2
PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

### Research and Dissertation

Code	Title	Hours
<b>Prequalifying Exam Course</b>		
PHSC 7020	Scientific Writing: Thesis Proposal	2
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

### Program Credit/GPA Requirements

31 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study (Standard Program)

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 7020 <sup>1</sup>	2
PHSC 5100		2 PHSC 5212		2	
PHSC 5102		2 PHSC 6214		2	
PMST 6254		3 PMST 6250		2	
		PMST 6252		3	
			8	10	2

  

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>2</sup>	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2

  

Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0

  

Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6810 <sup>3</sup>		1 PHSC 9996		0 PHSC 9996	0
PHSC 5305 <sup>4</sup>		1 PHSC 6213 <sup>4</sup>		2	
		2		2	0

Total Hours: 31

<sup>1</sup> Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.

<sup>2</sup> Doctoral Proposal (PHSC 9681) should be taken in summer of second year but no later than fall of third year.

<sup>3</sup> Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.

<sup>4</sup> Professional Development for Pharmaceutical Sciences (PHSC 5305) and Ethical Problems in Health Sciences Research (PHSC 6213) are suggested to be taken in the fourth year but can be taken at any point before graduation.

## Advanced Entry Program Requirements

Advanced entry into the Pharmaceutics and Drug Delivery PhD program requires a master's degree in pharmaceutical sciences or related area and focuses on various advanced research courses. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

- Annual review
- Qualifying examination
- Dissertation committee
- Dissertation proposal
- Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required</b>		
PHSC 6213	Ethical Problems in Health Sciences Research	2
<b>Seminar</b>	Complete the following repeatable course for four times:	4

PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1
<b>Research and Dissertation</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	

### Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

### Plan of Study (Advanced Entry)

<b>Year 1</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 8940		1 PHSC 8986 or 9681 <sup>1</sup>		0 PHSC 9681 <sup>1</sup>	2
PHSC 6300		1 PHSC 6300		1	
		2		1	2
<b>Year 2</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		PHSC 9991		1	0
		1		1	
<b>Year 3</b>					
Fall	Hours	Spring	Hours		
PHSC 6810 <sup>2</sup>		1 PHSC 9996		0	
PHSC 9996		0 PHSC 6213		2	
		1		2	

**Total Hours: 10**

<sup>1</sup> Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.

<sup>2</sup> Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

### Pharmacology, PhD

The pharmacology PhD enables students to specialize in the study of the actions of drugs and their effects in living systems. In addition to the opportunity for developing a sound knowledge base through coursework and seminars, the program is designed to strengthen students' ability to understand and evaluate critically current pharmacology literature, informing the students' independent laboratory research that advances our understanding of drugs, their actions, and their pharmacotherapeutic applications. Recent graduates with a pharmacology PhD have found employment in academic and industrial research positions.

### Journal Club Participation

The Department of Pharmaceutical Sciences sponsors weekly journal clubs, Pharmaceutical Science Seminar (PHSC 6300), at which students present and evaluate current scientific literature in their fields of study. Students must attend one of these journal clubs (Pharmaceutics & Drug Delivery Journal Club, Pharmacology Journal Club, or Medicinal Chemistry & Drug Discovery Journal Club), chosen in consultation with their advisors.

Attendance at one of these journal clubs is required each and every academic semester, as an integral part of the PhD curriculum, with the exception of the last year (year four) in the program. All PhD students must participate full-time in journal club for course credit, Pharmaceutical Science Seminar

(PHSC 6300), for six semesters. Failure to attend journal club regularly may result in sanctions such as probation or dismissal from the PhD program. Any student who does not comply with these (or any other) conditions required in the PhD program faces potential dismissal.

### **Colloquium Attendance**

All PhD students, regardless of program, are required to attend the weekly Pharmaceutical Science Colloquium series. Announcements of times and locations will be distributed weekly to students by email to their university email addresses. Attendance is recorded by sign-up sheet. One excused absence is permitted per semester. Failure to attend colloquia may result in sanctions such as probation or dismissal from the PhD program.

### **Internship Requirements and Regulations for Department of Pharmaceutical Sciences**

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in the pharmaceutical and biotechnology industries.

After PhD candidates have completed their dissertation research and are working on their dissertations, they are able, with the express permission of their PhD advisor, to participate in an internship if they choose. They are never allowed to intern while they are serving as teaching assistants.

1. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Students are responsible for tracking this experience on their resumés as there will be no detailed record on students' transcripts of these opportunities.
2. In order to be eligible for internship, students must take Professional Development for Pharmaceutical Sciences (PHSC 5305) a semester before internship.
3. Students must not accept more than one position. They must honor the first offer accepted. Any student not adhering to this requirement will not be allowed to participate.
4. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services (<https://international.northeastern.edu/ogs/>) every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
5. In order to receive a grade for the course, students must write at least two learning goals within the first two weeks of the internship and a one- to two-page paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
6. Taking internship must not extend international students' visas.
7. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers. For all other matters, please see the Universitywide Academic Policies and Procedures (p. 154) and/or Bouvé College of Health Sciences Academic Policies and Procedures (p. 629).

### **Milestones**

#### **QUALIFYING EXAMINATION**

The PhD qualifying examination is required for students in all four programs under the auspices of the Department of Pharmaceutical Sciences: pharmacology, medicinal chemistry and drug discovery, biomedical sciences, and pharmaceutics and drug delivery. Students from each of the four programs will take the exams within the same time frame (below), regardless of specialty-area program focus.

Doctoral students should have selected a dissertation advisor by the end of their first year in the program and are expected to have begun research and demonstrated initial proficiency in the laboratory before taking the PhD qualifying examination.

The PhD qualifying examination tests the candidates' knowledge and skills in core courses and program content areas. The overall PhD qualifying examination consists of two written exams and one oral exam. The qualifying examination is taken as a course, Doctoral Training and Research (PHSC 8940), no later than during the fall semester of the student's second year, after having successfully completed all the core courses of their respective programs.

At least two departmental faculty will contribute questions for the written exams, and no one faculty member will write more than the equivalent of one entire exam. All students qualified to sit for the exams are expected to take them at the times announced.

The format for the written exams may vary (e.g., faculty may ask a series of comprehensive essay questions or provide research publications(s) from the biomedical literature and ask questions based upon the publications' content). The first exam is given in the first week of fall semester, with the written portion of the second exam (i.e., the F31 written document) to be submitted to the student's exam committee by the end of October, with the oral presentation to be completed by mid-November and graded by the providers of the question(s).

- **Written exam 1** reflects students' knowledge of their specialty-area program material and of overall pharmaceutical sciences. This exam is given on the same day in two parts. Part 1 is focused on each student's specialty-area program focus. Part 2 will test students' overall knowledge in another program focus covered by the pharmaceutical sciences curriculum.
  - For example, if the student is in the pharmaceutics and drug delivery PhD program, part 1 will be about pharmaceutics and drug delivery, and part 2 can focus either on pharmacology or medicinal chemistry and drug discovery.
- **Written exam 2** requires that students write an NIH F31 grant proposal and have the proposal signed off as passing by their examination committee after an oral defense.

A score of at least 70% is required to pass the first written exam (two parts). Students must pass all written portions of the PhD qualifying examination prior to the oral defense of the F31 proposal. Students who fail one written exam will have one opportunity to retake and pass that examination. A student who fails the first exam twice will be required to withdraw from the PhD program.

During the oral exam, students defend their NIH F31 grant proposal before an examination committee of, minimally, four faculty members: the dissertation advisor, at least two other Department of Pharmaceutical Sciences faculty members, and at least one member from outside the department. This committee is convened only for the oral exam and does not need to be the same committee as the student's dissertation committee.

Members of the oral examination committee are selected by the student, after consultation with the dissertation advisor and/or the director of graduate studies. The oral exam is graded on a pass/fail basis. Students who fail the oral exam on the first attempt may retake the exam within a time period designated by the examination committee not to exceed two months from the first oral exam. Those who fail twice will be dismissed from the program.

### **DOCTORAL CANDIDACY STATUS**

Doctoral students who have completed satisfactorily and thereby earned the credits for all required core courses (including those for their specialized area) and who have passed the written and oral qualifying examinations shall be admitted to candidacy status for the PhD degree.

### **DOCTORAL DISSERTATION COMMITTEE**

Doctoral students must complete a dissertation that embodies the results of extended research and makes an original contribution to their field. This work should give evidence of candidates' abilities to conduct independent investigation and interpret the results of their research in a professional manner. The doctoral dissertation advisor serves as chairperson of the Doctoral Dissertation Committee, which consists of no fewer than five members. Selection of an advisor is by mutual consent of the student and a member of the faculty, with approval by the director of graduate studies in the Department of Pharmaceutical Sciences. At least two members of the Doctoral Dissertation Committee must be faculty members in the Department of Pharmaceutical Sciences. At least one member is to be selected from outside the department. Committee members are chosen for their expertise in students' research areas.

### **DISSERTATION PROPOSAL DEFENSE**

Within a year after successful completion of the PhD qualifying examination, but no later than the beginning of the fall semester of the third year, students must prepare and defend a written proposal detailing their planned dissertation project. Failure to do so will be regarded as a failure to progress in the PhD program and will result in a warning from the director of graduate studies of the Department of Pharmaceutical Sciences.

Students who do not correct this deficiency within one semester will be placed on academic probation. Students on academic probation must complete the dissertation proposal defense and return to nonprobationary status within one semester or be dismissed from the PhD program.

The dissertation proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should otherwise conform to the format and structure of an NIH grant proposal with four main sections: specific aims, background and significance, preliminary studies, and experimental design and methods. The Department of Pharmaceutical Sciences *Dissertation Proposal* document provides detailed instructions on the preparation of a dissertation proposal. Associated required forms may be found on the SOPPS Student Portal Canvas site.

The dissertation proposal must be defended orally before the student's dissertation committee and signed by all dissertation committee members in *approval of the student's planned dissertation research*. Upon dissertation approval, the copies of the signed proposal approval cover sheet (<https://northeastern.sharepoint.com/sites/BouveCurrentStudentResources/Current%20Student%20Forms%20Document%20Library/Forms/AllItems.aspx?id=%2Fsites%2FBouveCurrentStudentResources%2FCurrent%20Student%20Forms%20Document%20Library%2FPhD%20Forms%2FDissertation%20Proposal%20Approval%20Form%2Epdf&parent=%2Fsites%2FBouveCurrentStudentResources%2FCurrent%20Student%20Forms%20Document%20Library%2FPhD%20Forms>) must be submitted to the department's director of graduate studies and to the Bouvé College of Health Sciences Graduate Office.

### **BIANNUAL REVIEW**

Dissertation committees meet routinely at six-month intervals, but no less than once a year, to evaluate students' research progress and to be presented with written and oral progress reports on the direction and status of the research. Progress reports should be written in a brief format, identical to that described for the formal dissertation (see instructions listed on the SOPPS Student Portal Canvas site). Unsatisfactory productivity provides the basis for a warning by the dissertation committee and/or the Graduate Committee. Two such warnings will result in a student's dismissal from the program.

### **Registration for Dissertation**

Advisor consent and completion of all coursework (with the exception of the colloquium course) must be documented before students register for the first dissertation course. Students must register for Dissertation Term 1 (PHSC 9990) and Dissertation Term 2 (PHSC 9991). Students must register for Dissertation Continuation (PHSC 9996) each semester thereafter until the dissertation has been successfully defended. The department strongly encourages PhD students to complete the program within five years after acceptance, i.e., by three years after establishing degree candidacy. According to university policy, no PhD students may remain in the program for more than seven years.

### **Publications and Presentations**

Prior to completion of PhD training, candidates must present their research either as a poster or podium presentation at a regional or national scientific conference. Also prior to completion, the student must have submitted (preferably, published) at least one manuscript in a peer-reviewed journal that reflects original findings and laboratory work from the candidate's dissertation research.

### **PhD Dissertation Preparation**

Detailed guidelines for the format and content of the written dissertation are given in Instructions for Preparation of the Dissertation found on the SOPPS Student Portal Canvas site. The completed dissertation document should be reviewed first by the dissertation advisor. Feedback from the advisor should be incorporated into the dissertation draft before its distribution to the dissertation committee. The completed dissertation should be delivered to all dissertation committee members no later than two weeks before the scheduled oral defense.

### **PHARMACEUTICAL SCIENCES COLLOQUIUM**

All PhD candidates nearing completion of their research are required to present their dissertation findings at the department's Pharmaceutical Sciences Colloquium. These presentations should be scheduled at least six months before anticipated completion of the dissertation. In turn, the dissertation should be completed no later than one year after the colloquium presentation. Students must register for Pharmaceutical Science Colloquium (PHSC 6810) during the semester that the colloquium presentation is to be given.

### **ORAL DISSERTATION DEFENSE**

The oral dissertation defense takes place after students complete their PhD dissertation research and all other requirements for the PhD degree. The oral defense deals with the subject matter of the dissertation, significant developments in the field, and students' background knowledge in their field of concentration.

The dissertation committee conducts the final defense. The committee may recommend that the student clarify, amplify, or rewrite portions of the dissertation *before the final defense is scheduled*. Once the committee concurs that that written dissertation document is acceptable, a date is chosen for the final oral examination.

At least two weeks prior to the defense, students should inform the director of graduate studies in the Department of Pharmaceutical Sciences of the date of defense, so that advance announcement may be distributed. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student in a seminar format, and responses to audience and committee questions, the committee meets first with the student for any follow-up discussion and then in executive session to decide whether the student has defended the dissertation successfully.

The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and corrections, if applicable, and the dissertation is signed and passed on to the department's director of graduate studies. Requests for a second defense are highly irregular but may be permitted in the event that the previous oral defense was judged by the committee to be highly promising but inadequate in one critical aspect.

#### **Deadline**

The final dissertation must be written, defended, and approved at least two weeks before the university commencement deadline. Students must submit signed copies of their dissertations to the website designated by the university and must abide by any embargo sanctioned by the student's principal dissertation advisor and/or dissertation committee. The students should apply for graduation before the final dissertation defense, on the assumption that the dissertation will be approved. If the dissertation committee decides that more time is required to complete the dissertation beyond the commencement date, then the application for graduation can be withdrawn and a new one submitted pending final dissertation approval.

### **SOPPS PROFESSIONAL CODE OF CONDUCT**

All SOPPS students (BSPS, Preprofessional, MS, and PhD) are expected to adhere to the Code of Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>).

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Qualifying examination  
Doctoral candidacy status  
Doctoral dissertation committee  
Dissertation proposal  
Biannual review  
Pharmaceutical Sciences Colloquium

Oral dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
Complete the following repeatable course for six semesters:		
PHSC 6300	Pharmaceutical Science Seminar	6
<b>Required Core</b>		
Complete the following courses:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212	Research Skills and Ethics	2
PHSC 5305	Professional Development for Pharmaceutical Sciences	1
PHSC 6213	Ethical Problems in Health Sciences Research	2
PHSC 6214	Experimental Design and Biostatistics	2
<b>Pharmacology</b>		
PMCL 6250	Ion Channel Physiology and Pharmacology	3
PMCL 6252	Small-Molecule Target and Ligand Pharmacology	4

## Research & Dissertation

Code	Title	Hours
<b>Pre-Qualifying Exam Course</b>		
PHSC 7020	Scientific Writing: Thesis Proposal	2
<b>Qualifying Exam</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

## Plan of Study (Standard Program)

### Sample Plan

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5100		2 PHSC 5212		2 PHSC 7020 <sup>1</sup>	2
PHSC 5102		2 PHSC 6214		2	
PMCL 6250		3 PHSC 6300		1	
PHSC 6300		1 PMCL 6252		4	
		8		9	2
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>2</sup>	2
PHSC 8940		1 PHSC 8986		0	
		2		1	2

<b>Year 3</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	0
PHSC 9990		0 PHSC 9991		0	
		1		1	0

  

<b>Year 4</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 5305 <sup>4</sup>		1 PHSC 6213 <sup>4</sup>		2 PHSC 9996	0
PHSC 6810 <sup>3</sup>		1 PHSC 9996		0	
		2		2	0

**Total Hours: 30**

- 1 Scientific Writing: Thesis Proposal (PHSC 7020) must be taken the summer before the qualifying exams.
- 2 Doctoral Proposal (PHSC 9681) should be taken in summer of second year, but no later than fall of third year.
- 3 Pharmaceutical Science Colloquium (PHSC 6810) must be taken six months before dissertation defense.
- 4 PHSC 5305 & PHSC 6213 are suggested to be taken in the fourth year, but can be taken at any point before graduation.

## Sample Plan - Advanced Entry

<b>Year 1</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>1</sup>	2
PHSC 8940 <sup>1</sup>		1 PHSC 8986 or 9681 <sup>1</sup>		0	
		2		1	2

  

<b>Year 2</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	
PHSC 9990		PHSC 9991			
		1		1	0

  

<b>Year 3</b>					
Fall	Hours	Spring	Hours		
PHSC 6810 <sup>2</sup>		1 PHSC 6213		2	
PHSC 9996		PHSC 9996			
		1		2	

**Total Hours: 10**

- 1 Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.
- 2 Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

## Advanced Entry Program Requirements

Advanced entry into the PhD in Pharmacology requires a master's degree in pharmaceutical sciences or a related area and focuses on various advanced research courses and successful defense of the dissertation. An applicant's transcripts are required to be reviewed by the admissions committee to ensure they are eligible to be in the advanced entry program.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

- Annual review
- Qualifying examination
- Dissertation committee
- Dissertation proposal
- Dissertation defense

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required</b>		
PHSC 6213	Ethical Problems in Health Sciences Research	2
<b>Seminar</b>		
Complete the following repeatable course four times:		4
PHSC 6300	Pharmaceutical Science Seminar	
<b>Colloquium</b>		
PHSC 6810	Pharmaceutical Science Colloquium	1

## Research & Dissertation

Code	Title	Hours
<b>Qualifying Examination</b>		
PHSC 8940	Doctoral Training and Research	1
<b>Proposal Preparation</b>		
PHSC 9681	Doctoral Proposal	2
<b>Dissertation</b>		
PHSC 9990	Dissertation Term 1	
PHSC 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

10 total semester hours required

Minimum 3.000 GPA required

## Plan of Study (Advanced Entry)

### Sample Plan - Advanced Entry

<b>Year 1</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9681 <sup>1</sup>	2
PHSC 8940 <sup>1</sup>		1 PHSC 8986 or 9681 <sup>1</sup>		0	
		2		1	2
<b>Year 2</b>					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PHSC 6300		1 PHSC 6300		1 PHSC 9996	
PHSC 9990		PHSC 9991			0
		1		1	0
<b>Year 3</b>					
Fall	Hours	Spring	Hours		
PHSC 6810 <sup>2</sup>		1 PHSC 6213		2	
PHSC 9996		PHSC 9996			
		1		2	

**Total Hours: 10**

<sup>1</sup> Doctoral Proposal (PHSC 9681 (<https://catalog.northeastern.edu/search/?P=PHSC%209681>)) may be taken in spring of first year but must be taken before fall of second year.

<sup>2</sup> Pharmaceutical Science Colloquium (PHSC 6810 (<https://catalog.northeastern.edu/search/?P=PHSC%206810>)) must be taken six months before dissertation defense.

## Pharmacy, PharmD

Program requirements that follow relate to the final year of the six-year Doctor of Pharmacy (PharmD) program only. For information regarding years one through five of this program, please see the *Undergraduate Catalog Doctor of Pharmacy (Pharmacy, PharmD)* webpage.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
Complete 36 semester hours in the following range:		
PHMD 6440 to PHMD 6474		36

### Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

## Pharmacy, PharmD—Direct Entry

The School of Pharmacy and Pharmaceutical Sciences offers the Doctor of Pharmacy degree (PharmD). The direct-entry admission pathway for this program requires that students complete a BS or BA from an accredited institution with a preferred prerequisite grade-point average of 3.000. Only grades of C (2.000) or higher are acceptable to fulfill a prerequisite course. The following prerequisite courses and credits are required:

Requirements	Credits
Chemistry 1 and 2 (1 lab)	7
General biology 1 and 2 (1 lab)	7
Calculus (or higher-level math)	3
Organic chemistry 1 and 2 (w/labs)	8
Biochemistry	3
Anatomy and Physiology 1 and 2	7
Arts/humanities/social studies	4

Direct entry into the first professional year of the PharmD program offers students a four-year graduate course of study that fully integrates campus-based learning with experiential learning, including Northeastern University's signature cooperative education program, to provide students with the knowledge, skills, and abilities necessary to succeed in the pharmacy profession. Our students promote and ensure the safe and effective use of drugs and provide medication therapy management services. In addition to preparing and dispensing prescribed medications, our students provide information to patients about medications and their uses; advise physicians, other prescribers, and other healthcare practitioners on medication selection, dosages, interactions, and adverse effects; and monitor patient responses to drug therapy.

Our students are well equipped to provide patient care services in a variety of settings. Most of our graduates work in community pharmacies or in healthcare facilities such as hospitals and ambulatory clinics. Additional practice opportunities exist in health maintenance organizations, private practice groups, long-term-care facilities, home healthcare, the Public Health Service, the armed services, and law enforcement and regulatory agencies such as the Federal Drug Administration or Drug Enforcement Administration. Graduates may also find employment in drug development, marketing and research within the pharmaceutical industry, colleges of pharmacy, and professional association management. In addition, many of our graduates go on to pharmacy practice residencies, fellowships, and leading graduate programs.

PharmD students are admitted with the expectation that by working with faculty, staff, and each other, they will develop the knowledge, skills, and attitudes necessary for academic and professional success. Students follow academic progression plans for their respective years of graduation. Any deviation from the prescribed curriculum will require faculty/staff permission and an approved plan of study from the SOPPS Academic Standing Committee.

The curriculum includes both Introductory Pharmacy Practice Experiences (fulfilled with co-op) and Advanced Pharmacy Practice Experiences. These pharmacy practice experiences are provided primarily under the direct supervision of qualified pharmacist preceptors and occasionally with other qualified healthcare professionals. The school is affiliated with many world-class practice sites throughout the United States, providing students with access to experienced clinicians and scholars. Although every effort is made to accommodate individual circumstances and requests, students should be prepared to travel outside the Boston area to complete some of their pharmacy practice experiences. Availability of a car may be required,

as some sites are not accessible by public transportation. All expenses associated with pharmacy practice experiences, including travel and housing, are the responsibility of the student.

IPPEs are competitive placements that are based on job availability in a geographic region. The placements are facilitated by SOPPS cooperative education coordinators. Students are required to earn satisfactory (S) grades on one IPPE in a community setting and on one IPPE in an institutional/hospital practice setting.

APPE placements are provided based on site/preceptor availability and the final approval of the SOPPS Office of Experiential and Continuing Professional Education. Students may be able to petition the OECPE for out-of-system APPEs; however, availability for such requests is limited.

To be eligible for a PharmD, a student must successfully complete all courses in the curriculum, including the IPPEs/co-op and APPEs; meet the academic progression standards of the program; meet the technical standards of the program; and satisfy all other requirements as stated. The pharmacy program is fully accredited by the Accreditation Council for Pharmacy Education (<https://www.acpe-accredit.org/>) and adheres to the standards established by ACPE.

Pharmacy graduates must meet specific requirements to qualify for professional licensure in the state where they plan to practice as a registered pharmacist. These requirements include graduating from an accredited school of pharmacy, passing national and state board examinations, and completing internship hours. The internship is a period of practical experience conducted under the supervision of a registered pharmacist. Massachusetts requires 1,500 internship hours, all of which are satisfied through completion of IPPEs (co-op) and APPEs.

Professional and/or legal exigencies arise from time to time, which may necessitate changes in a pharmacy course, progression, and/or graduation requirements. Students should review their status with academic advisors on a timely basis and refer to current publications for updated information.

## **Requirements for the PharmD Pharmacy Practice Experiences**

Requirements for the successful completion of the PharmD PPEs include:

1. Evidence of health clearance from University Health and Counseling Services before placements at any PPE site.
2. Satisfactory completion of any additional site-specific requirements including, but not limited to, criminal record information (CORI), urine drug screens, and verification of immunization status. All fees associated with these requirements are the responsibility of the student.

### Management of Positive Urine Drug Screens

If the student learns the urine drug screen (test #1) is positive (+), the student will notify the OEE ([pharmacyoe@northeastern.edu](mailto:pharmacyoe@northeastern.edu)) and immediately complete a second urine screen (test #2). A professional concern form will be completed based on test #1 results.

If urine screen test #2 is negative (-), the student will be allowed to continue the PPEs. However, the student will be asked to complete a random urine screen (test #3) at a time determined by the OEE. If this urine screen (test #3) is positive, the student will be administratively removed from the active PPEs and graduation may be delayed. A second professional concern form will be completed, based on test #3 results. The return to PPEs will occur once a repeat urine test is negative. That repeat negative test will be followed up by a random urine screen at a time determined by the OEE.

If the urine screen (test #2) is positive, the student will be administratively removed from the PPEs and graduation may be delayed. The return to PPEs will occur once a repeat urine screen is negative. That negative screen will be followed up by a random urine screen at a time determined by the OEE. A second professional concern form will be completed based on a positive test #3 result.

3. Adherence to the school's code of professional conduct and university's code of conduct policies while off-campus.
4. Maintenance of an active pharmacy intern license in every state where the student completes an experience.
5. Compliance with site-specific requirements (via site descriptions) and completion of site requests within specified deadlines. Students who fail to complete these requirements as directed will likely incur grade penalties and may experience a delay of graduation or dismissal from the pharmacy program.

## **PROGRAM POLICIES**

Students are expected to adhere to the policies and standards of their program major as stated to progress through their curriculum as planned. Students seeking any exceptions to the program policies and standards specified for their program major must present a petition before the SOPPS Academic Standing Committee.

Given programmatic requirements, coupled with concerns over the loss of therapeutic knowledge, requests for a General Leave of Absence (<https://catalog.northeastern.edu/graduate/academic-policies-procedures/policies/>), other than Medical or Emergency Leave of Absence:

- Must comply with all stated Northeastern general policies, regardless of the academic year.
- May be made at any time period during the P1 or P2 years.
- During the P3 academic year, any request for a general leave must be made no later than February 1 of the given academic year. Requests after this date will not be permitted.

- During the P4 academic year, requests for a general leave cannot be made at any time.  
SOPPS—Professional Code of Conduct (<https://bouve.northeastern.edu/assets/uploads/sites/5/2021/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>)  
Preprofessional and professional-year students are expected to adhere to the Code of Professional Conduct. (<https://bouve.northeastern.edu/wp-content/uploads/2023/10/northeastern-school-of-pharmacy-code-of-professional-conduct-2021.pdf>)

Students are eligible to begin APPEs following successful completion of all didactic coursework. Completing didactic coursework during P4 year is prohibited.

### **TECHNICAL STANDARDS FOR THE DOCTOR OF PHARMACY PROGRAM**

The PharmD program at Northeastern is a rigorous and challenging academic program that requires students to possess specific characteristics and abilities within the cognitive, affective, and psychomotor domains, referred to here as technical standards. To successfully progress in and ultimately complete the didactic, laboratory, and experiential components of the PharmD program, students must meet the standards described below.

#### ***Intellectual Abilities***

Students must have well-developed problem-solving and critical-thinking skills. Cognitive function must be appropriate to integrate, evaluate, and apply information gained through measurement, analysis, calculation, and reasoning. Students must have the capacity to learn efficiently in classroom, laboratory, small group and experiential settings, and through independent study. Students are required to demonstrate the ability to integrate course content knowledge with clinical practice applications to optimize medication therapy management.

#### ***Communication Skills***

Students must be able to communicate effectively with colleagues, professors, patients, families, and healthcare providers. This includes efficiently comprehending, speaking, reading, and writing in English. Students must be able to process and use appropriate nonverbal cues and be proficient in the use of electronic communication media.

#### ***Behavioral and Social Attributes***

Students must demonstrate professionalism, maturity, integrity, honesty, compassion, and respect when relating to others. Students must have sufficient mental and emotional health to complete work and responsibilities using good judgment. Students must be able to tolerate and adapt to stressful workloads and situations and modify behavior based on constructive criticism. Students must be able to function in accordance with the legal, ethical, and professional standards of practice.

#### ***Observation and Motor Skills***

Students must have functional use of visual, auditory, and tactile senses. Students must be able to observe and perform experiments, physical assessments, patient interviews, and medication order processing. Students must be able to distinguish physical characteristics of medications by inspection. Students must have coordination of gross and fine muscular movements sufficient to perform pharmacy-related tasks including compounding and dispensing medications, administering medications, and using computers and other technology necessary for learning and professional practice.

### **ACADEMIC DISMISSAL FROM MAJOR**

PharmD students in the Bouvé College of Health Sciences will be dismissed from their major effective the following academic semester for any of the reasons noted below:

- Failure to earn a grade of C or better in three professional courses, regardless of remediation. Within the PharmD program, each specific professional course (with separate registration number) will be counted as a separate failure even if content is related.
- Failure to earn the minimum required grade in the same course twice.
- Failure to maintain a GPA of 3.000 after one semester of probation.
- The expected graduation date may not change more than twice.

The PharmD program monitors and promotes the development of professional behaviors in its students in order to ensure appropriate professionalism in the classroom, local and global communities, and clinical settings. Breach of adherence to these standards may result in dismissal from the program.

### **ACADEMIC APPEALS**

Students who believe that they were erroneously, capriciously, or otherwise unfairly treated in an academic or cooperative education decision may petition to appeal the decision. Refer to the Bouvé College of Health Sciences Academic Affairs Appeals Process (<https://catalog.northeastern.edu/graduate/health-sciences/academic-policies-procedures/appeals-process/>) and the Northeastern University Academic Appeals Policies and Procedures (<https://catalog.northeastern.edu/undergraduate/academic-policies-procedures/academic-appeals-policies-procedures/>).

### **PROGRAM STUDENT LEARNING OUTCOMES**

Please visit Bouvé College Program Learning Outcomes (<https://bouve.northeastern.edu/bchs/about/learning-outcomes/>) for the specific student learning outcomes for this program.

### **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### **Pharmacy Major (PharmD) Grade and Progression Requirement**

To progress into the subsequent semester of professional courses, students must receive a grade of C or better in all PHMD and PHSC courses, as well as in any course completed to fulfill the professional elective requirement.

For pharmacy students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

Students who incur an incomplete grade in a prerequisite course may not progress into the subsequent courses(s). Any exceptions will be determined by protocols established by the program, after consultation with the student's academic advisor.

### **Core Requirements**

Code	Title	Hours
<b>YEAR 1</b>		
PHMD 5115	Integrated Science and Therapeutics 2	4
PHMD 5120	Principles of Pharmacy Practice	4
PHMD 5140	Integrated Social and Administrative Sciences 1	4
PHMD 5182	Integrated Learning Lab 2	1
PHMD 5191	Concepts in Practice 1	1
PHMD 5192	Concepts in Practice 2	1
PHMD 6964	Co-op Work Experience (Introductory Pharmacy Practice Experience) <sup>1</sup>	0
PHSC 5110	Integrated Science and Therapeutics 1	4
PHSC 5130	Foundations of Pharmaceutical Sciences 1	4
PHSC 5181	Integrated Learning Lab 1	1
<b>YEAR 2</b>		
PHMD 5210	Integrated Science and Therapeutics 4	4
PHMD 5215	Integrated Science and Therapeutics 5	4
PHMD 5220	Integrated Science and Therapeutics 6	4
PHMD 5240	Integrated Social and Administrative Sciences 2	4
PHMD 5245	Integrated Social and Administrative Sciences 3	4
PHMD 5283	Integrated Learning Lab 3	1
PHMD 5284	Integrated Learning Lab 4	1
PHMD 5285	Integrated Learning Lab 5	1
PHMD 5293	Concepts in Practice 3	1
PHMD 5294	Concepts in Practice 4	1
PHMD 5295	Concepts in Practice 5	1
PHSC 5205	Integrated Science and Therapeutics 3	4
PHSC 5230	Foundations of Pharmaceutical Sciences 2	4
<b>YEAR 3</b>		
PHMD 5320	APPE Readiness	4
PHMD 5335	Integrated Science and Therapeutics 7	4
PHMD 5345	Integrated Social and Administrative Sciences 4	4
PHMD 5386	Integrated Learning Lab 6	1
PHMD 5396	Concepts in Practice 6	1
PHMD 6964	Co-op Work Experience (Introductory Pharmacy Practice Experience) <sup>1</sup>	0
<b>YEARS 3 and 4</b>		
Complete 36 semester hours of Advanced Pharmacy Practice Experience (APPE) from the following:		36
PHMD 6440	Internal Medicine Advanced Pharmacy Practice Experience	
PHMD 6441	Acute Care Advanced Pharmacy Practice Experience	

PHMD 6442	Ambulatory Care Advanced Pharmacy Practice Experience
PHMD 6443	Community Advanced Pharmacy Practice Experience
PHMD 6445	Ambulatory Care Elective Advanced Pharmacy Practice Experience
PHMD 6446	Psychiatry Advanced Pharmacy Practice Experience
PHMD 6447	Community Elective Advanced Pharmacy Practice Experience
PHMD 6448	Long-Term Care Advanced Pharmacy Practice Experience
PHMD 6449	Geriatrics Advanced Pharmacy Practice Experience
PHMD 6450	Pediatrics Advanced Pharmacy Practice Experience
PHMD 6451	Neonatology Advanced Pharmacy Practice Experience
PHMD 6452	Critical Care Advanced Pharmacy Practice Experience
PHMD 6453	Surgery Advanced Pharmacy Practice Experience
PHMD 6454	Cardiology Advanced Pharmacy Practice Experience
PHMD 6456	Drug Information Advanced Pharmacy Practice Experience
PHMD 6457	Oncology Advanced Pharmacy Practice Experience
PHMD 6461	Infectious Disease Advanced Pharmacy Practice Experience
PHMD 6462	Pharmacy Industry Advanced Pharmacy Practice Experience
PHMD 6463	Pharmacy Administration Advanced Pharmacy Practice Experience
PHMD 6464	Regulatory Advanced Pharmacy Practice Experience
PHMD 6465	Managed Care Advanced Pharmacy Practice Experience
PHMD 6466	Transplantation Advanced Pharmacy Practice Experience
PHMD 6467	Directed Practice Advanced Pharmacy Practice Experience
PHMD 6468	International Advanced Pharmacy Practice Experience
PHMD 6469	Management Advanced Pharmacy Practice Experience
PHMD 6470	Education Advanced Pharmacy Practice Experience
PHMD 6471	Research 1 Advanced Pharmacy Practice Experience
PHMD 6473	Radiopharmacy Advanced Pharmacy Practice Experience

<sup>1</sup> For pharmacy students, an unsatisfactory grade (U) in a co-op will be counted as a professional course deficiency.

## Elective Requirements

Code	Title	Hours
<b>Open Electives</b>		
A minimum of 8 semester hours of open electives is required.		
<b>Professional Electives</b>		
Complete at least 2 semester hours from the following:		
CAEP 6203	Understanding Culture and Diversity	
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5300	Personal Health Interface Design and Development	
HINF 5407	Business Application of Decision Support in Healthcare	
HINF 6205	Creation and Application of Medical Knowledge	
HINF 6220	Database Design, Access, Modeling, and Security	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6404	Patient Engagement Informatics and Analytics	
HLTH 5002	Mindfulness: Theory and Practice	
HLTH 5200	Magic and Healthcare: A Scientific Exploration	
HLTH 5280	The (in)Visibility of (dis)Ability in Society	
HLTH 5310	Introduction to Transgender Perspectives in Healthcare	
HLTH 5600	Introduction to Patient Safety	
HLTH 5700	Social Determinants of Health	
HSCI 5130	Introduction to Real-World Evidence	
HSCI 5140	Foundations of Data Models	
HSCI 5150	Methods for Observational Research 1	
HSCI 5151	Methods for Observational Research 2	

HSCI 5160	Standardization of Real-World Data
HSCI 5170	Data Model Transformation
HSCI 5180	Phenotyping
HSCI 5190	Cohort Building
HSCI 6110	Advanced Population Characterization
HSCI 6120	Advanced Population Estimation
HSCI 6130	Advanced Patient Prediction
MSCI 5001	Human Factors and Situational Awareness
MSCI 5002	Crisis Resource Management and Case Studies
MSCI 5003	Humanitarian Aid Practice and Principles
MSCI 5004	Humanitarian and Disaster Response Ethics
MSCI 5005	Care During Conflict
PHMD 3600	Leadership and Advocacy in Health Professions
PHMD 4350	Exploring Academic Careers
PHMD 4581	Cancer Chemotherapy
PHMD 4585	Research Methods in Health Systems
PHMD 4700	Principles in General Medicine
PHMD 4890	Contemporary Issues in Geriatric Pharmacy
PHMD 5223	Evidence-Based Medicine
PHMD 5575	Pharmaceutical Industry
PHMD 5675	Ambulatory Care Pharmacy Practice in Urban Health
PHMD 5900	Self-Care and Nonprescription Medications: A Team-Based Approach
PHMD 5976	Directed Study
PHMD 5984	Research
PHSC 5100	Concepts in Pharmaceutical Science
PHSC 5212	Research Skills and Ethics
PHSC 5400	Principles of Drug Design
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5555	Pharmaceutical Toxicology
PHSC 5976	Directed Study
PHSC 5984	Research
PHSC 6222	The Chemistry and Biology of Drugs of Abuse
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHTH 5222	Health Advocacy
PHTH 5226	Strategic Management and Leadership in Healthcare
PHTH 5230	Global Health
PHTH 5232	Evaluating Healthcare Quality
PHTH 5234	Economic Perspectives on Health Policy
PHTH 5300	Project Management in Public Health
PHTH 5310	Budget Principles in Public Health
PHTH 5320	Grant Writing in Public Health
PHTH 6320	Qualitative Methods in Health and Illness
PMST 6250	Advanced Physical Pharmacy
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

## Program Credit/GPA Requirements

118 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Sample Plan of Study****Year 1**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Professional Year 1 (P1)							
PHMD 5120	4	PHMD 6964 (IPPE)		0 PHMD 6964		0 PHMD 5115	4
PHMD 5140	4					PHMD 5182	1
PHMD 5191	1					PHMD 5192	1
PHSC 5110	4					Elective	2-4
PHSC 5130	4						
PHSC 5181	1						
	18			0		0	8-10

**Year 2**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Professional Year 2 (P2)							
PHMD 5240	4	PHMD 5210		4 PHMD 5220		4 PHMD 6964	0
PHMD 5283	1	PHMD 5215		4 PHMD 5285		1	
PHMD 5293	1	PHMD 5245		4 PHMD 5295		1	
PHSC 5205	4	PHMD 5284		1 Elective		2-4	
PHSC 5230	4	PHMD 5294		1			
Elective	2-4	Elective		2-4			
	14-16			14-16		6-8	0

**Year 3**

Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
Professional Year 3 (P3)		Professional Year 3 (P3)		Professional Year 4 (P4)		Professional Year 4 (P4)	
PHMD 6964	0	PHMD 5320		4 APPE (choose from PHMD 6440-PHMD 6474)		6 APPE (choose from PHMD 6440-PHMD 6474)	6
		PHMD 5335		4			
		PHMD 5345		4			
		PHMD 5386		1			
		PHMD 5396		1			
		Elective		2-4			
	0			14-16		6	6

**Year 4**

Fall	Hours	Spring	Hours
APPE (choose from PHMD 6440-PHMD 6474)	6	APPE (choose from PHMD 6440-PHMD 6474)	6
APPE (choose from PHMD 6440-PHMD 6474)	6	APPE (choose from PHMD 6440-PHMD 6474)	6
	12		12

Total Hours: 110-120

**Biomedical Science, MS**

The science and research surrounding human health and disease are becoming more interdisciplinary. In response to this trend, the biomedical science MS program allows students to focus on areas across the biomedical sciences to gain training in human (patho)physiology and the application of existing and potential therapeutic approaches to treat disease. The Master of Science in Biomedical Science curriculum is particularly appropriate both for those entering as well as those currently employed in the field, including research technicians, clinical laboratory workers, science teachers, and science administrators. For those currently employed, the program can enhance performance in a present position or open new employment opportunities. Graduates of the program will be well prepared to enter related PhD programs at the university.

**Curriculum Requirements**

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of

specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

## **Internship Requirements and Regulations for Department of Pharmaceutical Sciences**

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

## **General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences**

### **GRADING POLICY**

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 628) and Academic Probation Policy (p. 628) for full details.

### **PROGRESSION REQUIREMENT**

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p. 627) for details.

### **ACADEMIC HONESTY AND RESEARCH INTEGRITY**

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the School of Pharmacy and Pharmaceutical Sciences Code of Professional Conduct (p. 636) and to Northeastern University's Academic Integrity Policy (p. 155). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding

them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

### **SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES PROFESSIONAL CODE OF CONDUCT**

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

#### **MASTER OF SCIENCE THESIS OPTION**

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS students' research positions and the specific research focus.

#### ***Thesis Registration***

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

#### ***Thesis Committee***

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

#### ***Thesis Proposal***

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

#### ***Thesis Final Defense***

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

#### ***Thesis Deadline***

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
-

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212 or PHSC 6213	Research Skills and Ethics Ethical Problems in Health Sciences Research	2
PHSC 5300 or PHSC 7010	Pharmaceutical Biochemistry <sup>1</sup> Pharmaceutical Sciences Laboratory	2 or 4
PHSC 5310	Cellular Physiology	2
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2

## Electives

Code	Title	Hours
Complete 17–19 semester hours in the following subject areas: <sup>1</sup>		
PHSC, PMCL, PMST, BIOL, CHEM, NNMD, BIOT		17-19

## Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Complete the following (repeatable) course twice:		
PHSC 6990	Thesis	4
The following course may be taken if additional time is needed to complete the thesis:		
PHSC 6996	Thesis Continuation	2

<sup>1</sup> Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 17 elective credits; all other students must complete 19 elective credits.

## Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

## Medicinal Chemistry and Drug Discovery, MS

The Medicinal Chemistry & Drug Discovery MS program integrates aspects of contemporary medicinal chemistry and pharmacology, emphasizing topics most relevant to therapeutics design, discovery, and action. The core curriculum focuses on a combination of synthetic organic chemistry, bioorganic chemistry, analytical chemistry, and pharmacology courses. Specialized, in-depth electives are offered in these areas. The program is designed to develop students' knowledge of medicinal chemistry through design, synthesis, and pharmacological profiling of novel pharmacotherapeutics as applied to helping solve unmet medical needs. For this purpose, many program graduates have established research careers in the pharmaceutical/biotech industry. Undergraduate prerequisites are general chemistry, organic chemistry, and biochemistry or cell/molecular biology.

## Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

## Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities. International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

## **General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences**

### **GRADING POLICY**

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 628) and Academic Probation Policy (p. 628) for full details.

### **PROGRESSION REQUIREMENT**

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p. 627) for details.

### **ACADEMIC HONESTY AND RESEARCH INTEGRITY**

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the School of Pharmacy and Pharmaceutical Sciences Code of Professional Conduct (p. 636) and to Northeastern University's Academic Integrity Policy (p. 155). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

### **SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES PROFESSIONAL CODE OF CONDUCT**

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

## MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS students' research positions and the specific research focus.

### ***Thesis Registration***

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

### ***Thesis Committee***

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

### ***Thesis Proposal***

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

### ***Thesis Final Defense***

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

### ***Thesis Deadline***

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212 or PHSC 6213	Research Skills and Ethics Ethical Problems in Health Sciences Research	2
<b>Medicinal Chemistry &amp; Drug Discovery</b>		
CHEM 5626	Organic Synthesis 1	3
CHEM 5628	Principles of Spectroscopy of Organic Compounds	3
CHEM 5672	Organic Synthesis 2	3
CHEM 5676	Bioorganic Chemistry	3
PHSC 5400	Principles of Drug Design	3
PHSC 6222	The Chemistry and Biology of Drugs of Abuse	2
PHSC 6224	Behavioral Pharmacology and Drug Discovery	2
PHSC 6290	Biophysical Methods in Drug Discovery	2

## Electives

Code	Title	Hours
Complete 6 semester hours in the following subject areas:		
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		6

## Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		
PHSC 6990	Thesis	4
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	2

## Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

## Pharmaceutical Engineering, MS

The Master of Science in Pharmaceutical Engineering is offered jointly by Northeastern University's College of Engineering and Bouvé College of Health Sciences. The program prepares students with a fundamental understanding of pharmaceutical sciences and principles of engineering to develop the depth needed for advanced study of pharmaceutical engineering.

This program is generally pursued by students with a Bachelor of Science in Chemical Engineering or closely allied fields in engineering, sciences, or mathematics. The program was designed in collaboration with the Department of Pharmaceutical Sciences to develop the depth needed for advanced study of pharmaceutical engineering. Students wishing to pursue the master's degree with undergraduate educational backgrounds other than engineering are required to demonstrate completion of mathematics coursework through differential equations or the equivalent to be admitted. Students are advised to work closely with their advisors and instructors to determine the electives that would meet their career goals.

## Part-Time Students

Part-time students may progress according to their plans and time constraints but within the seven-year time limit.

Master of Science students wishing to change their status from part time to full time must notify the chemical engineering department and make a formal petition to the Graduate School of Engineering. Refer to the regulations of the Graduate School of Engineering for further information on academic administrative policies.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
CHME 7600	Pharmaceutical Engineering I	4
CHME 7601	Pharmaceutical Engineering II	4
CHME 7602	Pharmaceutical Engineering Laboratory	2
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 7010	Pharmaceutical Sciences Laboratory	4

## Restricted Elective Courses

Code	Title	Hours
At least 3 semester hours of total elective courses are required from pharmaceutical sciences (PHSC, PMST) and from chemical engineering (CHME). These semester hours could come from any elective group, as appropriate.		
<b>Regulatory</b>		
Complete 3 semester hours from the following:		
BIOT 5340	Introduction to Biotherapeutic Approvals	3
BIOT 5500	Concepts in Regulatory Science	
BIOT 6320	Design and Development of Biopharmaceuticals	
RGA 6002	Introduction to Regulatory Compliance and Practice	
<b>Quality/Statistics</b>		
Complete 4 semester hours from the following:		
CHME 5185	Design of Experiments and Ethical Research (DOEER)	4
IE 6200	Engineering Probability and Statistics	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
PHSC 6214	Experimental Design and Biostatistics	
<b>Depth Electives</b>		
Complete 7 semester hours from the following:		
BIOT 5330	Drug Safety and Immunogenicity	7
BIOT 6300	Pharmaceutical Microbiology	
BIOT 6340	Sterile Manufacturing Operations	
BIOT 7250	Advanced Biotechnology Applications Laboratory	
CHME 5101	Fundamentals of Chemical Engineering Analysis	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 5179	Complex Fluids and Everyday Materials	
CHME 5185	Design of Experiments and Ethical Research (DOEER)	
CHME 5631	Biomaterials Principles and Applications	
CHME 5632	Advanced Topics in Biomaterials	
CHME 5683	Introduction to Polymer Science	
CHME 7330	Chemical Engineering Thermodynamics	
CHME 7350	Transport Phenomena	
PHSC 5300	Pharmaceutical Biochemistry	
PHSC 5310	Cellular Physiology	
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies	
PHSC 5555	Pharmaceutical Toxicology	
PHSC 5560	Nanotoxicity	
PHSC 5619	Mass Spectrometry in Drug Development	
PMST 6250	Advanced Physical Pharmacy	

PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Pharmaceutics and Drug Delivery, MS

Just as cars are useless without roads, drugs are useless without effective delivery systems. This is especially important in contemporary pharmaceutical research, as new chemical entities may be either too hydrophobic (e.g., many anticancer drugs) or hydrophilic and highly labile (e.g., nucleic acids). The Bouvé College of Health Sciences School of Pharmacy Pharmaceutics and Drug Delivery students and faculty are developing the routes for bringing small-molecule drugs and biological therapies directly to target cells responsible for major diseases.

Our comprehensive Pharmaceutics and Drug Delivery MS program includes faculty members in pharmaceutics and drug development specializing in the use and delivery of therapeutics. The program faculty seeks to improve the understanding and description of how chemical and physical properties of drugs and dosage forms affect drug performance in healthy and diseased systems. Graduate students may choose from programs concentrating in:

- Novel drug delivery systems
- Biopharmaceutics and pharmacokinetics
- Physical pharmacy and polymeric dosage form development
- Drug metabolism

With a strong focus on nanotechnology-based advanced delivery systems that address contemporary therapeutic needs, the pharmaceutical sciences program also gives students opportunities to study with some of the world's top pharmaceutics researchers. Students in the Pharmaceutics and Drug Delivery MS program have the option of performing industrial internships (typically during the summer) in some of the most prestigious pharmaceutical and biotechnology companies in the Boston area.

Please visit Bouvé College Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

## Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
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9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
10. Taking internship must not extend international students' visas.

## General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences

### GRADING POLICY

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 628) and Academic Probation Policy (p. 628) for full details.

### PROGRESSION REQUIREMENT

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

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### ACADEMIC HONESTY AND RESEARCH INTEGRITY

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### SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES PROFESSIONAL CODE OF CONDUCT

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### MASTER OF SCIENCE THESIS OPTION

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS students' research positions and the specific research focus.

#### *Thesis Registration*

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and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

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#### **Thesis Deadline**

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

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  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
Complete the following courses:		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212 or PHSC 6213	Research Skills and Ethics Ethical Problems in Health Sciences Research	2
PHSC 5300 or PHSC 7010	Pharmaceutical Biochemistry <sup>1</sup> Pharmaceutical Sciences Laboratory	2 or 4
PHSC 5310 or PHSC 7010	Cellular Physiology <sup>1</sup> Pharmaceutical Sciences Laboratory	2 or 4
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
<b>Pharmaceutics and Drug Delivery</b>		
PMST 6250	Advanced Physical Pharmacy	2

PMST 6252	Pharmacokinetics and Drug Metabolism	3
PMST 6254	Advanced Drug Delivery Systems	3

## Electives

Code	Title	Hours
Complete 9–11 semester hours from the following subject areas: <sup>1</sup>		
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		9-11

## Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		
PHSC 6990	Thesis	4
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	2

<sup>1</sup> Students who opt to complete 4-credit Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 9 elective credits; all other students must complete 11 elective credits.

## Program Credit/GPA Requirements

33 total semester hours required  
Minimum 3.000 GPA required

### Pharmacology, MS

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Graduate education in pharmacology embodies the principles and mechanisms of drug action in biological systems. Through coursework, seminars, and conferences, students in the pharmacology MS program gain exposure to both classical and recent approaches that have led to the development of current theories of drug action and therapeutic application. Pharmacology should not be confused with pharmacy programs or training, which lead to professional licensure as a pharmacist and involve medication management.

## Curriculum Requirements

All MS programs in the Department of Pharmaceutical Sciences require a set of core courses taken by every MS student, regardless of program. In addition, students in each program are required to take a defined set of discipline-specific courses and several general electives. The number of specialized and elective courses differs somewhat among programs. The MS degree may be completed on either a full-time or part-time basis and may include an optional research thesis. International students are required to attend the program on a full-time basis.

## Internship Requirements and Regulations for Department of Pharmaceutical Sciences

Internships provide an experiential component of the graduate curriculum that fosters professional development through work in industry and hospitals.

1. In order to participate in an internship, students must complete two semesters with a grade-point average of 3.200 or better; be in good academic and professional standing (i.e., have no Professionalism Concern forms filed); and have no instances of academic dishonesty or blocks on enrollment.
2. In order to be eligible for internship, students must take the Professional Development for Pharmaceutical Sciences (PHSC 5305) course in either the fall or spring semester of their first year.
3. Students are in school full-time in addition to working on their internships.
4. There are no vacations on co-op/internships. Companies' sick time policies may vary. Students should check with their employers.
5. Students are responsible for finding their own internship and must be honest and accurate representing their experiences on their resumés. Prior to looking for an internship, students must have their faculty advisor approve their resumé and ascertain to the best of their ability that the skills and training of students are as presented.
6. Students must not accept more than one position. They must honor the first offer accepted.
7. In order to receive a grade for the course, students must write at least two learning goals and a paper describing what they learned, mid- and end of semester. Supervisors for internships will reply to a questionnaire about students' performance.
8. International students must register for Pharmaceutical Science Internship (PHSC 6401) and follow instructions to receive Curricular Practical Training authorization from the Office of Global Services every semester they work. This applies to part-time jobs and volunteer opportunities.

- International students cannot engage in full-time CPT authorization totaling more than 52 weeks. Doing so will eliminate the possibility of engaging in the postgraduation benefit of Post-Completion Optional Practical Training.
9. Students receive 1 academic credit per semester for Pharmaceutical Science Internship (PHSC 6401). If students want to do an internship for a fourth semester they may do so, but students will only receive a maximum of 3 credits for Pharmaceutical Science Internship (PHSC 6401). The 4th credit for Pharmaceutical Science Internship (PHSC 6401) will not be added to the student's degree.
  10. Taking internship must not extend international students' visas.

## **General Policies Common to All MS Programs in the Department of Pharmaceutical Sciences**

### **GRADING POLICY**

Students are expected to maintain a GPA of 3.000 (B) or higher in all coursework. Students whose cumulative GPA falls below 3.000 will receive written notification from the Bouvé Office of Graduate Student Services that they have been placed on academic probation. A student must clear the deficiency and return to nonprobationary status within one semester, unless the course that must be retaken is not offered during the probationary semester. In such a case, the course to be retaken must be completed during the next semester that it is offered, and the GPA must be restored to at least 3.000. Failure to remediate the deficiencies and return to nonprobationary status within the established time limit will result in dismissal from the MS program. Refer to the Bouvé College of Health Sciences policy on Academic Dismissal (p. 628) and Academic Probation Policy (p. 628) for full details.

### **PROGRESSION REQUIREMENT**

Bouvé College of Health Sciences policy specifies that students register for coursework or continuation credit each semester of the academic year (fall and spring semesters) after they are matriculated as full- or part-time students. Moreover, international students are required to maintain full-time student status during each academic term; consult the Office of Global Services (<https://international.northeastern.edu/ogs/>) for specific requirements. Domestic students who are not able to register for courses during a particular semester must petition the director of graduate studies in the department for exemption in writing and state the reasons for the exemption and their plan for resuming their studies. Approval of the petition will preserve student status in the MS program.

All MS students are expected to complete the degree requirements within two years if enrolled on a full-time basis, or within three to five years if enrolled on a part-time basis. If progress toward the degree is slowed or interrupted for personal reasons, the student so affected must petition the School of Pharmacy and Pharmaceutical Sciences Academic Standing Committee for an extension, detailing the anticipated time to completion. If an extension is approved, the student will be directed to meet with the graduate program director to devise a formal plan to achieve completion of the degree.

Course credits earned in the Bouvé College of Health Sciences Graduate School or accepted for transfer from another institution and not applied to obtain a previous degree are valid for a maximum of seven years. Refer to the Bouvé College of Health Sciences Academic Progression policies and procedures (p. 627) for details.

### **ACADEMIC HONESTY AND RESEARCH INTEGRITY**

The Department of Pharmaceutical Sciences has a zero-tolerance policy regarding academic dishonesty and violations of research integrity. It is each student's responsibility to understand and adhere to the School of Pharmacy and Pharmaceutical Sciences Code of Professional Conduct (p. 636) and to Northeastern University's Academic Integrity Policy (p. 155). Definitions of plagiarism, cheating, fabrication, falsification, unauthorized collaboration, and actions that facilitate academic or research dishonesty can be found on the Office of Student Conduct and Conflict Resolution website (<https://osccr.sites.northeastern.edu/>). The lack of knowledge of these definitions does not excuse the student's responsibility for upholding them. Offenses of academic honesty and research integrity are egregious violations of ethical standards and may result in disciplinary actions, including the student's immediate dismissal from the graduate program.

### **SCHOOL OF PHARMACY AND PHARMACEUTICAL SCIENCES PROFESSIONAL CODE OF CONDUCT**

All SOPPS students (BS Pharmaceutical Sciences, Preprofessional, MS, and PhD) are expected to adhere to the SOPPS Code of Professional Conduct.

### **MASTER OF SCIENCE THESIS OPTION**

Students who undertake a thesis are expected to report the results of extended research in a written thesis document and make an original contribution to their field. This work should give evidence of the students' abilities to conduct independent research and interpret their research results in an acceptable manner. Arrangements are made by students interested in the thesis option with individual laboratory directors as to the availability of MS students' research positions and the specific research focus.

#### ***Thesis Registration***

Students may receive a maximum of 4 semester hours of credit for MS thesis research. Students should register for Thesis (PHSC 6990), twice for 2 SH each during the fall and spring semesters of their second full year of study, or after completing 15 credits of study. If completion of the thesis requires additional time, students should register for Thesis Continuation (PHSC 6996)(0 SH).

#### ***Thesis Committee***

Each student's thesis committee should be composed of at least three members: two from the sponsoring program and one from outside the student's program. The outside member may be a Northeastern faculty member. The director of graduate studies for the pharmaceutical sciences department may appoint additional members, as considered necessary for student development. The student's major advisor, in whose laboratory the research is being conducted, will serve as committee chair. The student, after consulting with the committee chair, is responsible for calling all thesis committee meetings.

### **Thesis Proposal**

The thesis proposal should be no more than 50 double-spaced pages (12-point font minimum and one-half-inch margins on all sides). This page limit excludes references but includes figures, figure legends, and tables. Aside from these exceptions, the proposal should conform to the format and structure of an NIH grant proposal with four sections: specific aims, background and significance, preliminary studies, and experimental design and methods. See the Department of Pharmaceutical Sciences "Thesis Proposal" document for detailed instructions on the preparation of a thesis proposal and the required forms located in the School of Pharmacy and Pharmaceutical Sciences Student Portal on Canvas in the module section.

The thesis proposal must be defended orally before the thesis committee and signed by all thesis committee members before the student undertakes the planned research. The signed cover page of the proposal should be submitted to the director of graduate studies, pharmaceutical sciences department, and to the Bouvé College of Health Sciences Graduate Office.

### **Thesis Final Defense**

The final defense is taken after the student completes the thesis research and all other requirements for the MS degree. The defense deals with the subject matter of the thesis, significant developments in the field, and the student's background knowledge in their field of specialization. The thesis committee conducts the final defense.

At least two weeks prior to the expected date of the oral defense, the written thesis must be circulated to the student's thesis committee. After initial committee evaluation, recommendation may be made that the student clarify or rewrite portions of the thesis before scheduling the final defense. After the thesis committee concurs that the thesis is acceptable, a date is chosen for the final oral examination. At least two weeks prior to the defense, the student should inform the director of graduate studies in the pharmaceutical sciences department so that an announcement can be distributed to faculty and students. The final defense is open to anyone who wishes to attend and typically lasts at least two hours. After presentation of the work by the student, and responses to audience and committee questions, the student's committee meets in executive session to decide whether the student has successfully defended the thesis. The committee's decision is then announced to the student. If the committee's vote is favorable, the student incorporates committee suggestions and the thesis is signed off and passed on to the director of graduate studies in the department. Requests for a second defense are unusual but may be permitted if the original oral defense was judged significantly inadequate.

### **Thesis Deadline**

The thesis should be written, defended, and signed at least two weeks before the university commencement deadline. Students must submit signed copies of the thesis to the online site designated by the university.

Please visit Bouvé College of Health Sciences Program Learning Outcomes (<https://bouve.northeastern.edu/learning-outcomes/>) for the specific student learning outcomes for this program.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

A grade of C– or higher is required in each course.

Code	Title	Hours
<b>Required Core</b>		
PHSC 5100	Concepts in Pharmaceutical Science	2
PHSC 5102	Concepts in Pharmaceutical Science 2	2
PHSC 5212 or PHSC 6213	Research Skills and Ethics Ethical Problems in Health Sciences Research	2
PHSC 5300 or PHSC 7010	Pharmaceutical Biochemistry <sup>3</sup> Pharmaceutical Sciences Laboratory	2 or 4
PHSC 5310 or PHSC 7010	Cellular Physiology <sup>3</sup> Pharmaceutical Sciences Laboratory	2 or 4
PHSC 6214	Experimental Design and Biostatistics	2
PHSC 6216	Human Physiology and Pathophysiology	2
<b>Pharmacology</b>		

PMCL 6250	Ion Channel Physiology and Pharmacology	3
PMCL 6252	Small-Molecule Target and Ligand Pharmacology	4

## Electives

Code	Title	Hours
Complete 10–12 semester hours from the following subject areas: <sup>3</sup>		
BIOL, BIOT, CHEM, NNMD, PHSC, PMCL, PMST		10-12

## Thesis Option

Thesis credits may count toward the required elective hours.

Code	Title	Hours
Thesis research should be taken twice.		
PHSC 6990	Thesis	4
Thesis continuation may be taken if additional time is needed to complete the thesis.		
PHSC 6996	Thesis Continuation	2

- 1 Pharmacology 1 (PMCL 6260) and Receptor Pharmacology (PMCL 6262) are only offered in even-numbered years in the spring semester (example: Spring 2020).
- 2 Pharmacology 2 (PMCL 6261) is only offered in odd-numbered years in the spring semester (example: Spring 2021). Pharmacology 1 does not have to be taken before Pharmacology 2.
- 3 Students who opt to complete 4-semester hours Pharmaceutical Sciences Laboratory (PHSC 7010) in the core requirements may complete the degree with 10 elective semester hours; all other students must complete 12 elective semester hours.

## Program Credit/GPA Requirements

33 total semester hours required

Minimum 3.000 GPA required

## Pharmacy, PharmD—Direct Entry / Public Health, MPH

The School of Pharmacy and Pharmaceutical Sciences and the Department of Health Sciences offer a combined Doctor of Pharmacy (PharmD) and Master of Public Health (MPH) program.

The combined PharmD/MPH program recognizes and reinforces the importance of public health in pharmacy practice. Central to addressing public health concerns, and in particular those associated with racial and ethnic health disparities, the program is committed to building a strong, diverse, and activist public health workforce. The goal of the program is to graduate professionals who are well educated in the complex issues associated with disparate health status and healthcare access. The combined PharmD/MPH program allows qualified and interested students an opportunity to achieve their goal of obtaining a more robust understanding of public health through an MPH degree while also completing their PharmD.

Refer to the School of Pharmacy and Pharmaceutical Sciences PharmD—Direct Entry (p. 782) and Department of Health Sciences Master of Public Health (p. 710) pages of this catalog for program requirements and technical standards. Students must adhere to all PharmD and MPH program standards, policies, and requirements as listed in the catalog, unless otherwise specified.

The Northeastern University Master of Public Health Program is accredited by the Council of Education for Public Health (<https://ceph.org/>). CEPH is an independent agency recognized by the U.S. Department of Education to accredit schools of public health and public health programs outside of schools of public health.

## School of Law

**James R. Hackney, JD**, Dean

**Hemanth C. Gundavaram, JD**, Associate Dean for Academic and Faculty Affairs

**Kristin Madison, JD**, Associate Dean for Academic Programs

**Greg Houghton**, Associate Dean for Administration and Finance

**Julian M. Fray, JD, LLM**, Associate Dean for Digital Strategy

**Kiana Pierre-Louis, JD**, Associate Dean for Equity, Belonging, and Student Affairs

**Lua Yuille, JD**, Associate Dean for Research and Interdisciplinary Education

**Sarah Rethage, JD**, Associate Dean of Strategic Initiatives and Enrollment

Northeastern University School of Law (<https://law.northeastern.edu/>)  
416 Huntington Avenue  
Boston, MA 02115  
617.373.5149

Today's legal environment demands that attorneys be nimble, entrepreneurial, and savvy; in all of these regards, graduates of the Northeastern University School of Law excel. Our curriculum, taught by nationally recognized faculty, provides students with a superior understanding of how the law applies in real settings, a strong ethical framework, and the experience to strategically pursue their professional objectives. Our co-op program sets us apart from all other law schools—our JD students complete many hours of work in law offices, judges' chambers, corporations, nonprofit organizations, and government. As a result of their co-op experiences, Northeastern JD students are not just sitting in classes hearing about the rapid changes in the legal world—they live them.

Our community also provides a refreshing refutation of the law school stereotype as a place of ruthless competition and blind ambition. Instead, we cultivate an atmosphere that is collaborative, collegial, and supportive. Our students' eagerness to work in teams, help one another, and share their experiences reflects that ethos. Our faculty and staff are exceptionally supportive of students—not only because our small community encourages extensive student-faculty interaction but also because they share their students' passion for justice.

In addition to offering both full-time and part-time JD programs, the School of Law offers on-campus and online LLM programs for lawyers, a Master of Legal Studies program for nonlawyers, and a number of other programs. Our suite of LLM opportunities is offered for both those who hold a U.S. law degree and those who hold a first professional law degree from a law school outside of the United States.

**Programs****Juris Doctor (JD)**

- Law (p. 804)

**Master of Laws (LLM)**

- Law (p. 806)
- Law (p. 809)—Experiential
- Law—Online

**Master of Legal Studies (MLS)**

- Legal Studies—Online (p. 812)

**Master of Science (MS)**

- Media Advocacy (p. 236)

**Graduate Certificates**

- Business Law (p. 815)
- Healthcare Compliance (p. 816)
- Health Law (p. 817)
- Human Resources Law (p. 819)
- Intellectual Property Law (p. 821)
- United States Law (p. 825)

**FOR JD STUDENTS ONLY:**

- Health Law and Policy (p. 818)
- Human Rights Law (p. 820)
- Legal Design (p. 821)
- Poverty Law and Economic Justice (p. 822)
- Privacy Law (p. 824)
- Women, Gender, Sexuality, and the Law (p. 826)

**Dual Degrees**

- Law, JD / Accounting and Business Administration, MSAMBA (p. 315)
- Law, JD / Business Administration, MBA—Full-Time (p. 315)
- Law, JD / Criminology and Justice Policy, PhD (p. 828)
- Law, JD / Criminology and Criminal Justice, MS (p. 828)
- Law, JD / Public Health, MPH (p. 662)

- Law, JD / Public Policy, MPP (p. 829)
- Law, LLM / Business Administration, MBA—Full-Time (p. 315)

## Academic Policies and Procedures

Below, you will find select policies pertaining to the Juris Doctor program. For a comprehensive document with all policies and procedures, see the JD Student Handbook (<https://asa.law.northeastern.edu/>).

- Grades (p. 804)

### Grades

#### Grades

Students will receive credit for courses in which they receive a grade of "High Honors," "Honors," "Pass," or "Marginal Pass" but not for courses in which they receive a grade of "Fail." If any class is designated as offered on a credit/fail basis, students will not receive credit for the class if they receive a grade of "Fail."

#### Incomplete Grades

The School of Law follows university policy on incomplete grades (p. 179).

### Law, JD

#### Overview

Students at Northeastern University School of Law gain unparalleled networking opportunities from the moment they walk in the door. While many law schools talk about offering work experience, Northeastern Law has been the nation's leader in experiential legal education for five decades. Northeastern launched its Cooperative Legal Education Program in 1968 and today offers the largest and most extensive hands-on professional program in the country. Students devote several of their upper-level terms to working full-time as legal professionals. Through the co-op program, students have the opportunity to experience various fields of law in multiple practice settings.

Northeastern Law students gain real work experience and networking opportunities that far exceed the offerings of other law schools. With more than 1,500 employers in more than 40 states and a number of countries around the world, Northeastern students create professional networks in legal offices ranging from large firms in Boston to government agencies in Washington, D.C., to human rights organizations in Geneva. Through these connections and with access to the more than 8,000 alumni, Northeastern Law students graduate with not only a resumé packed full of experience but also a network that is unrivaled.

The School of Law offers a curriculum that provides students the tools they will need to pursue a successful legal career. In their first year, JD students complete required coursework. In their second and third years, they explore areas of interest by completing multiple full-time co-ops and taking courses that provide insight into many areas of the law.

#### Interdisciplinary Graduate Certificates

The School of Law offers JD students the option to pursue one of the following interdisciplinary graduate certificates:

- Health Law and Policy (p. 818)
- Human Rights Law (p. 820)
- Legal Design (p. 821)
- Poverty Law and Economic Justice (p. 822)
- Privacy Law (p. 824)
- Women, Gender, Sexuality, and the Law (p. 826)

#### Dual Degrees

The School of Law offers multiple dual degrees (p. 827).

*For a more comprehensive description of policies, procedures, and requirements pertaining to the JD program, please refer to the School of Law's website (<https://www.northeastern.edu/lawstudentaffairs/>).*

#### Full-Time Option

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements described below.

## Milestones

Code	Title	Hours
<b>Public Interest Requirement</b> <sup>1</sup>		
<b>Upper-Level Rigorous Writing Requirement</b> <sup>2</sup>		
<b>Experiential Education Requirement</b> <sup>2</sup>		
<b>Co-op Requirement: Co-ops corresponding to three terms</b> <sup>3</sup>		

Note: All courses used to satisfy JD requirements must be completed with a passing grade. Students must satisfactorily complete all JD requirements, including the public interest requirement, the upper-level rigorous writing requirement, the experiential education requirement, and the co-op requirement.

## First-Year Course Requirements

Code	Title	Hours
<b>Fall Term</b>		
LAW 6100	Civil Procedure	5
LAW 6105	Property	4
LAW 6106	Torts	4
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2
<b>Spring Term</b>		
LAW 6101	Constitutional Law	4
LAW 6102	Contracts	5
LAW 6103	Criminal Justice	4
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2

## Upper-Level Course Requirements

Code	Title	Hours
<b>Professional Responsibility</b>		
LAW 7443	Professional Responsibility	3
<b>Electives</b>		
Complete 46 credits of elective coursework.		46

Rules and policies applicable to elective coursework are described in the School of Law Student Information Handbook.

## Program Credit Requirement

83 total credits required.

<sup>1</sup> Information about the public interest requirement is provided in the Student Information Handbook.

<sup>2</sup> The same course cannot be used to satisfy both the rigorous writing and experiential education requirements.

<sup>3</sup> Transfer students should consult the Student Information Handbook for applicable requirements. All students with questions about satisfying co-op requirements should consult the Center for Co-op and Career Development.

## Part-Time Option

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements described below.

## Milestones

Code	Title	Hours
Public Interest Requirement <sup>1</sup>		
Upper-Level Rigorous Writing Requirement <sup>2</sup>		
Experiential Education Requirement <sup>2</sup>		

**Two practical experiences during separate terms when the student is not registered for coursework other than the practical experience(s), including at least one co-op in the form of a field placement with a related seminar; and 1,000 hours of relevant work experience.<sup>3</sup>**

Note: All courses used to satisfy JD requirements must be completed with a passing grade. Students must satisfactorily complete all JD requirements, including the public interest requirement, the upper-level rigorous writing requirement, the experiential education requirement, and the co-op, field placement, practical experience, and relevant work experience requirement.

## First-Year Course Requirements

Code	Title	Hours
Students will take the following courses during their first four semesters:		
LAW 6100	Civil Procedure	5
LAW 6101	Constitutional Law	4
LAW 6102	Contracts	5
LAW 6103	Criminal Justice	4
LAW 6105	Property	4
LAW 6106	Torts	4
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2
LAW 6160	Legal Skills in Social Context	2
LAW 6165	LSSC: Legal Research and Writing Component	2

## Upper-Level Course Requirements

Code	Title	Hours
<b>Field Placement</b>		
Complete one of the following two pairs of courses:		
LAW 7940 or LAW 7941	Reflections on Lawyering Public Interest / Public Service Field Placement	8
LAW 7945 or LAW 7946	Field Placement Seminar Field Placement	
<b>Professional Responsibility</b>		
LAW 7443	Professional Responsibility	3
<b>Electives</b>		
Complete 38 credits of LAW courses not already taken to fulfill another requirement.		

Rules and policies applicable to upper-level courses are described in the School of Law Student Information Handbook.

## Program Credit Requirement

83 total credit hours required.

<sup>1</sup> Information about the public interest requirement is provided in the Student Information Handbook.

<sup>2</sup> The same course cannot be used to satisfy both the rigorous writing and experiential education requirements.

<sup>3</sup> Transfer students should consult the Student Information Handbook for applicable requirements. All students with questions about the nature of these requirements should consult the Student Information Handbook and the Center for Co-op and Career Development.

## LLM Program Requirements

The LLM program offers a rigorous curriculum that provides a comprehensive foundation in legal theory and practice as well as the freedom to explore and refine students' career interests. LLM students may choose the general program, which offers maximum flexibility to choose the courses the

student wants and needs—to qualify for a U.S. bar exam or to do whatever the student chooses as a lawyer who wants to make a difference—or one of the program's concentrations, which provides a competitive advantage in specific fields of interest.

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Foundational Courses

These foundational courses are required for any student who obtained their first law degree outside the United States:

Code	Title	Hours
LAW 6301	Introduction to American Law and Legal Institutions	2
LAW 6302	Introduction to Legal Research and Writing for LLM Students	2

## Electives

Code	Title	Hours
	Students must take at least 20 credits of LAW electives if they took the foundational courses; they must take at least 24 credits of LAW electives if not required to take foundational courses. Courses taken to fulfill concentration requirements count toward the elective requirement.	20 or 24

## Concentration Options

Students may choose to pursue a concentration by completing the listed requirements. Courses taken to fulfill concentration requirements count toward the elective requirement for the LLM degree.

- Health Policy and Law (p. 807)
- Human Rights and Economic Development (p. 807)
- Intellectual Property and Innovation (p. 808)
- International Business Law (p. 808)

## Health Policy and Law

Code	Title	Hours
<b>Core Course</b>		
LAW 7335	Health Law	3–4

### Relevant Elective Courses

Complete at least two of the following:

LAW 7494	Bioethics and the Law
LAW 7512	Problems in Public Health Law
LAW 7527	Public Health Advocacy Clinic
LAW 7588	Reproductive Rights, Justice, and Health
LAW 7600	Current Issues in Health Law and Policy
LAW 7606	Drug Law and Policy
LAW 7619	Healthcare Fraud and Abuse Law
LAW 7695	Drug and Device Innovation: Law and Policy

Students must also complete a paper related to health law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

## Human Rights and Economic Development

Code	Title	Hours
<b>Core Courses</b>		
Complete one of the following:		
LAW 7338	International Law	3–4
LAW 7491	International Human Rights and the Global Economy	

LAW 7525	Law and Economic Development	
LAW 7651	Human Rights in the United States	
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		5–16
LAW 7015	Law, Technology, and Economic Development	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7358	Social Welfare Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7550	Refugee and Asylum Law	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7610	Community Business Law Clinic	
LAW 7651	Human Rights in the United States	
LAW 7657	Immigrant Justice Clinic	
Students must also complete a paper related to human rights and/or economic development. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.		
<b>Intellectual Property and Innovation</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Core Courses</b>		
Complete one of the following:		3–4
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7638	Trademark Law	
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		6–12
LAW 7015	Law, Technology, and Economic Development	
LAW 7303	Antitrust	
LAW 7323	Corporations	
LAW 7369	Intellectual Property	
LAW 7417	Entertainment Law	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7633	Intellectual Property Law Clinic	
LAW 7638	Trademark Law	
LAW 7640	Information Security Law	
LAW 7669	Law and Technology	
LAW 7672	Data Privacy Compliance in the 21st Century	
LAW 7695	Drug and Device Innovation: Law and Policy	
Students must also complete a clinic or paper related to intellectual property and innovation. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement. A clinic that counts toward the four-course requirement may not be used to also satisfy this requirement.		
<b>International Business Law</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Core Courses</b>		
Complete one of the following:		3–4
LAW 7525	Law and Economic Development	
LAW 7559	International Trade	

LAW 7603	International Business Transactions	
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		5–8
LAW 7015	Law, Technology, and Economic Development	
LAW 7323	Corporations	
LAW 7324	Securities Regulation	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7369	Intellectual Property	
LAW 7424	Labor Law 1	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7556	Corporate Finance	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7603	International Business Transactions	

Students must also complete a paper related to international business law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

## Program Credit Requirement

24 total hours required.

For additional information regarding the LLM program and its requirements, please see the LLM student information handbook.

## LLM Experiential Program Requirements

The Experiential LLM program offers a rigorous curriculum that is designed to provide a comprehensive foundation in legal theory and practice as well as the freedom to explore and refine students' career interests. Experiential LLM students may choose the general program, which offers maximum flexibility to choose the courses the student wants and needs—to qualify for a U.S. bar exam or to do whatever the student chooses as a lawyer who wants to make a difference—or one of the program's concentrations, which provide a competitive advantage in specific fields of interest. Students in the full-time Experiential LLM program deepen their knowledge and expand their expertise by taking a full-time co-op or equivalent experiential alternative during one academic term.

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Foundational Courses

These foundational courses are required for any student who obtained their first law degree outside the United States:

Code	Title	Hours
LAW 6301	Introduction to American Law and Legal Institutions	2
LAW 6302	Introduction to Legal Research and Writing for LLM Students	2
LAW 6315	Legal Research and Writing for LLM Students: Preparing for Co-op	2

## Electives

Code	Title	Hours
	Students must take at least 18 credits of LAW electives if they took the foundational courses; they must take at least 24 credits of LAW electives if not required to take foundational courses. Courses taken to fulfill concentration requirements count toward the elective requirement.	18–24

## Concentration Options

Students may choose to pursue a concentration by completing the listed requirements. Courses taken to fulfill concentration requirements count toward the elective requirement for the LLM degree.

- Health Policy and Law (p. 810)
- Human Rights and Economic Development (p. 810)
- Intellectual Property and Innovation (p. 811)
- International Business Law (p. 811)

### Health Policy and Law

Code	Title	Hours
<b>Core Course</b>		
LAW 7335	Health Law	3–4
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		
LAW 7494	Bioethics and the Law	6–7
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Advocacy Clinic	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	
LAW 7695	Drug and Device Innovation: Law and Policy	

Students must also complete a paper related to health law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

### Human Rights and Economic Development

Code	Title	Hours
<b>Core Courses</b>		
Complete one of the following:		
LAW 7338	International Law	3
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7651	Human Rights in the United States	
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		
LAW 7015	Law, Technology, and Economic Development	5–16
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7358	Social Welfare Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7550	Refugee and Asylum Law	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7610	Community Business Law Clinic	
LAW 7651	Human Rights in the United States	
LAW 7657	Immigrant Justice Clinic	

Students must also complete a co-op or paper related to human rights and/or economic development. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

## Intellectual Property and Innovation

Code	Title	Hours
<b>Core Courses</b>		
Complete one of the following:		3–4
LAW 7369	Intellectual Property	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7638	Trademark Law	
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		6–12
LAW 7015	Law, Technology, and Economic Development	
LAW 7303	Antitrust	
LAW 7323	Corporations	
LAW 7369	Intellectual Property	
LAW 7417	Entertainment Law	
LAW 7501	Patent Law	
LAW 7590	Copyright Law	
LAW 7633	Intellectual Property Law Clinic	
LAW 7638	Trademark Law	
LAW 7640	Information Security Law	
LAW 7669	Law and Technology	
LAW 7672	Data Privacy Compliance in the 21st Century	
LAW 7695	Drug and Device Innovation: Law and Policy	

Students must also complete a co-op, clinic, or paper related to intellectual property and innovation. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement. A clinic that counts toward the four-course requirement may not be used to also satisfy this requirement.

## International Business Law

Code	Title	Hours
<b>Core Courses</b>		
Complete one of the following:		3–4
LAW 7525	Law and Economic Development	
LAW 7559	International Trade	
LAW 7603	International Business Transactions	
<b>Relevant Elective Courses</b>		
Complete at least two of the following:		5–8
LAW 7015	Law, Technology, and Economic Development	
LAW 7323	Corporations	
LAW 7324	Securities Regulation	
LAW 7336	Immigration Law	
LAW 7338	International Law	
LAW 7369	Intellectual Property	
LAW 7424	Labor Law 1	
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7556	Corporate Finance	
LAW 7559	International Trade	
LAW 7569	International and Foreign Legal Research	
LAW 7603	International Business Transactions	

Students must also complete a co-op or paper related to international business law. To fulfill this requirement, a paper must satisfy the criteria of the JD rigorous writing requirement.

## Experiential Requirement

Students must take one full-time co-op or equivalent experiential alternative of at least 12 weeks (or an equivalent period over multiple terms, for part-time students).

## Program Credit Requirement

24 total hours required

For additional information regarding the Experiential LLM program and its requirements, please see the LLM student information handbook.

### Law, LLM—Online

The online LLM program offers students an opportunity to receive specialized legal training beyond the training they have already received in a JD program or an equivalent law degree program outside the United States. The elective courses in the program will provide insight into legal issues in areas such as intellectual property, privacy, and business. Students interested in taking a bar exam will be able to strengthen their foundational knowledge of U.S. law by taking courses with content tested on bar examinations. The asynchronous online format affords flexibility with respect to the times and location at which students complete their work.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Foundational Course

This foundational course is required for any student who obtained their first law degree outside the United States.

Code	Title	Hours
LAW 6400	Introduction to U.S. Law and Legal System	3

### Electives

Code	Title	Hours
	Students must take at least 21 credits of LAW electives if they took the foundational course; they must take at least 24 credits of LAW electives if not required to take the foundational course.	21-24

## Program Credit

24 total hours required

Minimum 3.000 GPA required.

### Legal Studies, MLS—Online

The Master of Legal Studies program is designed for professionals who want a deeper understanding of law and legal concepts. Such professionals may be found in nonprofit organizations, foundations, financial services firms, pharmaceutical companies, insurance firms, compliance departments, or a host of other commercial and noncommercial settings. Examples of the professionals who would be interested in this degree are human resource professionals, claims representatives for insurance companies, professionals in healthcare organizations, bank loan officers, real estate brokers, risk managers, government affairs officers, management consultants advising organizations, development officers working on planned giving, and software entrepreneurs. They desire to know more about the law and to be able to deal more effectively with the lawyers with whom they interact during their professional lives. The degree includes concentrations in human resources law, business law, intellectual property law, health law, and public law and policy.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Foundation Courses

Code	Title	Hours
LS 6101	Introduction to Legal Studies 1: Law and Legal Reasoning	3
LS 6102	Introduction to Legal Studies 2	3

### Core Courses

Code	Title	Hours
Complete at least four of the following:		12-18
LS 6110	Law of Information and Records	
LS 6120	Law and Strategy	
LS 6130	Negotiation and Advocacy	
LS 6140	Data Regulation and Compliance	
LS 6150	Law and Organizational Management	
LS 6155	Legal Foundations of Public Policy	

### Electives

Code	Title	Hours
Students who do not take a concentration must take 6–12 semester hours from this list to complete the degree:		6-12
LS 6160	Regulation and Global Business Strategies	
LS 6170	Financial Transactions	
LS 6180	Health Law Survey	
LS 6181	Healthcare Regulation and Compliance	
LS 6182	Patient Records, Privacy, and Security	
LS 6210	Special Topics in Employee Rights and Employer Obligations	
LS 6211	Antidiscrimination Law	
LS 6212	Wages and Benefits	
LS 6230	Intellectual Property Survey	
LS 6231	Identifying and Securing Intellectual Property Rights	
LS 6232	Intellectual Property and Media	
LS 6235	Current Issues in Law and Public Policy	

### Concentration Options

Students may choose to complete one of the concentrations described below. Students who pursue a concentration must take the two required foundation courses, at least four core courses, the courses listed in the concentration, and at least one additional course from the list of electives.

#### CONCENTRATION IN BUSINESS LAW

Code	Title	Hours
LS 6160	Regulation and Global Business Strategies	3
LS 6170	Financial Transactions	3
LS 6230	Intellectual Property Survey	3
or LS 6210	Special Topics in Employee Rights and Employer Obligations	

#### CONCENTRATION IN HEALTH LAW

Code	Title	Hours
LS 6180	Health Law Survey	3
LS 6181	Healthcare Regulation and Compliance	3
LS 6182	Patient Records, Privacy, and Security	3

**CONCENTRATION IN HUMAN RESOURCES LAW**

Code	Title	Hours
LS 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211	Antidiscrimination Law	3
LS 6212	Wages and Benefits	3

**CONCENTRATION IN INTELLECTUAL PROPERTY LAW**

Code	Title	Hours
LS 6230	Intellectual Property Survey	3
LS 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232	Intellectual Property and Media	3

**CONCENTRATION IN PUBLIC LAW AND POLICY**

Code	Title	Hours
LS 6155	Legal Foundations of Public Policy	3
LS 6235	Current Issues in Law and Public Policy	3
Complete one of the following:		4
LPSC 7311	Strategizing Public Policy	
PPUA 6500	Principles of Public Administration	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

**Program Credit/GPA Requirements**

30 total semester hours required

Minimum 3.000 GPA required

**Media Advocacy, MS**

The Master of Science in Media Advocacy places particular focus on developing direct and indirect advocacy skills: that is, to influence government decision makers directly and to change minds indirectly through shifting public opinion. The program uniquely combines grounding in governmental structures and the legal system with sophisticated training in the latest communication techniques including social media, web communications, and videography, as well as data analytics and data-driven storytelling. Successful graduates will be empowered to promote the public agenda of employers ranging from mission-driven organizations, such as the ACLU or the Sierra Club, to industry leaders, such as hospitals and technology companies, to lobbying and strategic communications groups and political consulting firms.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Core Requirements**

Code	Title	Hours
JRNL 5400	Media and Advocacy in Theory and Practice	4
JRNL 5480	Research for Media Strategy	4
LW 6400	Law, Policy and Legal Argument	4
LW 7667	Law and Ethics of Advocacy	3

**Electives**

Code	Title	Hours
A minimum of 17 credits of electives is required. No more than 8 semester hours can be taken outside of the College of Arts, Media, and Design or the School of Law.		17

Complete a minimum of 4 semester hours of coursework from the College of Arts, Media, and Design. Choose from recommended focus areas of JRNL, ARTD, ARTG, COMM, and INAM (additional areas may be chosen in consultation with your adviser).

Complete a minimum of 5 semester hours of coursework from the School of Law.

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Sample One-and-a-Half Years with No Co-op

Year 1							
Fall	Hours	Spring	Hours	Summer 1	Hours	Summer 2	Hours
JRNL 5400	4	JRNL 5480		Vacation		Vacation	0
LW 6400	4	Elective 2		3-4			
Elective 1	3-4	Elective 3		3-4			
	11-12		10-12			0	0

  

Year 2							
Fall	Hours						
LW 7667	3						
Elective 4	3-4						
Elective 5	3-4						
Elective 6	3-4						
	12-15						

Total Hours: 33-39

## Graduate Certificates

- Business Law (p. 815)
- Healthcare Compliance (p. 816)
- Health Law (p. 817)
- Human Resources Law (p. 819)
- Intellectual Property Law (p. 821)
- United States Law (p. 825)

The School of Law also offers the following interdisciplinary certificates (<https://law.northeastern.edu/academics/programs/jd/jdx-certificates/>) to students enrolled in its JD program:

- Health Law and Policy (p. 818)
- Human Rights Law (p. 820)
- Legal Design (p. 821)
- Poverty Law and Economic Justice (p. 822)
- Privacy Law (p. 824)
- Women, Gender, Sexuality, and the Law (p. 826)

### Business Law, Graduate Certificate

The Graduate Certificate in Business Law is designed to provide professionals in large and small enterprises with an ability to recognize, navigate, and leverage the laws that regulate business organizations and transactions.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at <a href="mailto:lawstudentaffairs@northeastern.edu">lawstudentaffairs@northeastern.edu</a> for guidance on registering for courses from the School of Law.		
LS 6102 or LW 6102	Introduction to Legal Studies 2	3
LS 6160 or LW 6160	Regulation and Global Business Strategies	3
LS 6170 or LW 6170	Financial Transactions	3
Complete one of the following:		
LS 6210 or LW 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6230 or LW 6230	Intellectual Property Survey	3
LS 6230 or LW 6230	Intellectual Property Survey	3

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Healthcare Compliance, Graduate Certificate

The Graduate Certificate in Healthcare Compliance is designed to give law students, MBA students, and working professionals tools they need to successfully navigate the world of healthcare compliance. This 15-credit, one-year program jointly offered by the School of Law and the D'Amore-McKim School of Business gives students the opportunity to learn about the laws that govern the healthcare system while developing the business knowledge and skills critical to healthcare compliance.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Requirements

Code	Title	Hours
<b>Required Courses</b>		
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at <a href="mailto:lawstudentaffairs@northeastern.edu">lawstudentaffairs@northeastern.edu</a> for guidance on registering for courses from the School of Law.		
LS 6182 or LW 6182	Patient Records, Privacy, and Security	3
LS 6180 or LW 6180	Health Law Survey	3
Complete one of the following:		
HINF 5105	The American Healthcare System (MBA students should take this course)	3
LAW 7335 or LW 7335	Health Law (Law students should take this course)	3
LS 6180 or LW 6180	Health Law Survey	3

**Elective**

Complete three of the following:

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FINA 6200	Value Creation through Financial Decision Making
HRMG 6220	Health Organization Management
LAW 7344	Accounting/Finance for Lawyers
LAW 7494 or LW 7494	Bioethics and the Law
LAW 7619	Bioethics and the Law
LS 6110 or LW 6110	Healthcare Fraud and Abuse Law
LS 6120 or LW 6120	Law of Information and Records
LS 6140 or LW 6140	Law of Information and Records
PHTH 5232	Law and Strategy
SCHM 6223	Law and Strategy
STRT 6220	Data Regulation and Compliance
	Data Regulation and Compliance
	Evaluating Healthcare Quality
	Managing Healthcare Supply Chain Operations
	Strategic Management for Healthcare Organizations

**Program Credit/GPA Requirements**

15 total semester hours required

Minimum 3.000 GPA required

**Health Law, Graduate Certificate**

Healthcare is a complex legal arena, as it encompasses several key stakeholders, from providers to patients to insurers. The Graduate Certificate in Health Law can help individuals recognize and navigate the varying legal needs in this space; an introductory course is paired with three courses tailored to the health industry.

The program helps to prepare graduates with the knowledge and skills to:

- Summarize and apply the appropriate statutes and regulations to concrete situations
- Examine legal regulations governing the provision and financing of healthcare services
- Gain an in-depth overview of health and compliance programs and the code of conduct for particular fields

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Requirements**

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at <a href="mailto:lawstudentaffairs@northeastern.edu">lawstudentaffairs@northeastern.edu</a> for guidance on registering for courses from the School of Law.		
LS 6102 or LW 6102	Introduction to Legal Studies 2	3
LS 6180 or LW 6180	Health Law Survey	3
LS 6181 or LW 6181	Healthcare Regulation and Compliance	3
	Healthcare Regulation and Compliance	

LS 6182 or LW 6182	Patient Records, Privacy, and Security Patient Records, Privacy, and Security	3
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## Program Credit/GPA Requirements

12 total credits required  
Minimum 3.000 GPA required

### Health Law and Policy, Graduate Certificate

The Graduate Certificate in Health Law and Policy, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of health law and policy.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Law Courses

Code	Title	Hours
LAW 7335	Health Law	3
Code	Title	Hours
In addition, complete one of the following:		
LAW 7410	Domestic Violence Clinic	
LAW 7469	Disability Law	
LAW 7494	Bioethics and the Law	
LAW 7512	Problems in Public Health Law	
LAW 7527	Public Health Advocacy Clinic	
LAW 7536	Employment Law - Safety and Health	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7600	Current Issues in Health Law and Policy	
LAW 7606	Drug Law and Policy	
LAW 7619	Healthcare Fraud and Abuse Law	

### Required Non-Law Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		
HINF 5200	Theoretical Foundations in Personal Health Informatics	
HINF 6335	Management Issues in Healthcare Information Technology	
HINF 6350	Public Health Surveillance and Informatics	
HLTH 5600	Introduction to Patient Safety	
HLTH 5700	Social Determinants of Health	
HRMG 6220	Health Organization Management	
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5226	Strategic Management and Leadership in Healthcare	
PHTH 5230	Global Health	
PHTH 5232	Evaluating Healthcare Quality	

PHTH 5300	Project Management in Public Health
PHTH 5310	Budget Principles in Public Health
PHTH 5320	Grant Writing in Public Health
PHTH 6200	Principles and History of Urban Health
PHTH 6204	Society, Behavior, and Health
PHTH 6208	Urban Community Health Assessment
PHTH 6224	Social Epidemiology
PPUA 5240	Health Policy and Politics
SOCL 7267	Environment, Health, and Society
STRT 6220	Strategic Management for Healthcare Organizations

## Additional Requirements

**Co-op Requirement:** Students must complete at least one co-op related to the certificate topic.

**Writing Requirement:** Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

## Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

### Human Resources Law, Graduate Certificate

The workplace has drastically changed in the past decade and keeps on evolving. This leads to many new human resources legal and regulation challenges. The Graduate Certificate in Human Resources Law is designed to provide professionals who work in human resources with the skills needed to recognize and navigate the many legal issues that arise within this heavily regulated field.

The program helps to prepare graduates with the knowledge and skills to:

- Summarize and apply the appropriate statutes and regulations to concrete situations
- Examine laws and regulations governing the management of people resources
- Gain an in-depth overview of human resources compliance programs and policies
- Leverage specialized knowledge in human resources law and regulations to achieve personal and institutional goals

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at <a href="mailto:lawstudentaffairs@northeastern.edu">lawstudentaffairs@northeastern.edu</a> for guidance on registering for courses from the School of Law.		
LS 6102 or LW 6102	Introduction to Legal Studies 2	3
LS 6210 or LW 6210	Special Topics in Employee Rights and Employer Obligations	3
LS 6211 or LW 6211	Antidiscrimination Law	3

LS 6212 or LW 6212	Wages and Benefits Wages and Benefits	3
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## Program Credit/GPA Requirements

12 total credits required  
Minimum 3.000 GPA required

### Human Rights Law, Graduate Certificate

The Graduate Certificate in Human Rights Law, open to JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of human rights law.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required LAW Courses

Code	Title	Hours
Complete one of the following:		
LAW 7491	International Human Rights and the Global Economy	3
LAW 7651	Human Rights in the United States	

Code	Title	Hours
In addition, complete one of the following:		
LAW 7338	International Law	3
LAW 7491	International Human Rights and the Global Economy	
LAW 7525	Law and Economic Development	
LAW 7651	Human Rights in the United States	

### Required Non-LAW Courses

Code	Title	Hours
Complete two of the following:		
PHIL 5001	Global Justice	6-8
PTH 5230	Global Health	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7387	Global Governance	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SOCL 7221	Globalization, Development, and Social Justice	

### Additional Requirements

**Co-op Requirement:** Students must complete at least one co-op related to the certificate topic. Consult an advisor about the applicability of the JD co-op.

**Writing Requirement:** Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

### Program Credit/GPA Requirements

12 total semester hours required, including at least 6 credits of LAW courses and at least 6 credits of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

### Intellectual Property Law, Graduate Certificate

The Graduate Certificate in Intellectual Property Law is designed to provide professionals who work in intellectual property, technology transfer, licensing, or related areas, as well as inventors and entrepreneurs, with the skills they need to recognize and protect intellectual property rights.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Requirements

Code	Title	Hours
Students enrolled in Northeastern University colleges other than the School of Law should contact a School of Law advisor at <a href="mailto:lawstudentaffairs@northeastern.edu">lawstudentaffairs@northeastern.edu</a> for guidance on registering for courses from the School of Law.		
LS 6102 or LW 6102	Introduction to Legal Studies 2	3
LS 6230 or LW 6230	Intellectual Property Survey	3
LS 6231 or LW 6231	Identifying and Securing Intellectual Property Rights	3
LS 6232 or LW 6232	Intellectual Property and Media	3

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Legal Design, Graduate Certificate

The Graduate Certificate in Legal Design, open to JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of legal design.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required LAW Courses

Requires 6 semester hours of LAW courses.

Code	Title	Hours
Complete one of the following:		
LAW 7635	Laboratory Seminar in Applied and Critical Legal Design	3-4
LAW 7662	Master Class in Legal Design	
Code	Title	Hours
Complete one of the following:		
LAW 7369	Intellectual Property	2-4
LAW 7501	Patent Law	
LAW 7614	Law Practice Management: Access to Justice	
LAW 7620	Human Behavior, Legal Doctrine, and Policy Design	
LAW 7624	Advanced Legal and Interdisciplinary Research	
LAW 7669	Law and Technology	

## Required Non-LAW Courses

Requires 6 semester hours of non-LAW courses.

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		
ARTG 5110	Information Design History	6-8
ARTG 5150	Information Visualization Principles and Practices	
ARTG 5310	Visual Cognition	
ARTG 5600	Experience Design Studio 1: Principles	
ARTG 5610	Design Systems	
ARTG 5640	Prototyping for Experience Design	
ARTG 6310	Design for Behavior and Experience	
ARTG 6600	Experience Design Studio 2: Group and Interpersonal	
COMM 6304	Communication and Inclusion	
GSND 5110	Game Design and Analysis	
GSND 6320	Psychology of Play	
GSND 6340	Biometrics for Design	
INAM 6100	Critical Foundations of Creative Practice	
JRNL 5500	Coding for Digital Storytelling	
JRNL 6341	Telling Your Story with Data	
THTR 6100	Advanced Creative Storytelling for Social Engagement	

## Additional Requirements

**Co-op Requirement:** Students must complete at least one co-op related to the certificate topic.

**Writing Requirement:** Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and has a clear connection to the certificate topic or significantly advances a legal innovation project using legal design methods.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

## Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

## Poverty Law and Economic Justice, Graduate Certificate

The Graduate Certificate in Poverty Law and Economic Justice, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of poverty law and economic justice.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Law Courses

Code	Title	Hours
Complete one of the following:		
LAW 7358	Social Welfare Law	
LAW 7362	Poverty Law and Practice Clinic	
LAW 7424	Labor Law 1	
LAW 7525	Law and Economic Development	
LAW 7664	Law and Inequality	
LAW 7684	Anatomy of Autonomy	
Code	Title	Hours
In addition, complete one of the following:		
LAW 7333	Family Law	3-8
LAW 7335	Health Law	
LAW 7336	Immigration Law	
LAW 7350	Negotiation	
LAW 7358	Social Welfare Law	
LAW 7362	Poverty Law and Practice Clinic	
LAW 7410	Domestic Violence Clinic	
LAW 7428	State Local Government	
LAW 7448	Employment Discrimination	
LAW 7469	Disability Law	
LAW 7488	Sexuality, Gender, and the Law	
LAW 7491	International Human Rights and the Global Economy	
LAW 7512	Problems in Public Health Law	
LAW 7525	Law and Economic Development	
LAW 7527	Public Health Advocacy Clinic	
LAW 7530	Education Law	
LAW 7535	Legal Interviewing and Counseling	
LAW 7540	Employment Law—Compensation, Benefits, and Retirement	
LAW 7550	Refugee and Asylum Law	
LAW 7582	Elder Law	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7597	Civil Rights and Restorative Justice Clinic	
LAW 7606	Drug Law and Policy	
LAW 7607	Consumer Law	
LAW 7608	American Legal Thought: Traditional and Critical	
LAW 7610	Community Business Law Clinic	
LAW 7657	Immigrant Justice Clinic	
LAW 7664	Law and Inequality	
LAW 7679	Race and the Law	
LAW 7684	Anatomy of Autonomy	

### Required Non-Law Courses

Code	Title	Hours
Complete one of the following:		
PPUA 5245	Education Policy in the United States	4

PPUA 5270	Food Systems and Public Policy	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	
<b>Code</b>	<b>Title</b>	<b>Hours</b>
In addition, complete one of the following:		4
LPSC 5201	Law and the City	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	
SOCL 7263	Social Psychology of Stratification	

## Additional Requirements

**Co-op Requirement:** Students must complete at least one co-op related to the certificate topic.

**Writing Requirement:** Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's *Student Information Handbook*.

## Program Credit/GPA Requirements

Minimum 12 total credits required, including at least 6 credits of LAW courses and at least 6 credits of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

## Privacy Law, Graduate Certificate

The Graduate Certificate in Privacy Law, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the field of privacy law.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required LAW Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following:		
LAW 7640	Information Security Law	6

LAW 7672	Data Privacy Compliance in the 21st Century
LAW 7675	Information Privacy Law

## Required Non-LAW Courses

Code	Title	Hours
Complete at least two courses totaling at least 6 semester hours from the following list:		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	6
HINF 5101	Introduction to Health Informatics and Health Information Systems	
HINF 5102	Data Management in Healthcare	
HINF 5300	Personal Health Interface Design and Development	
JRNL 6202	Perspectives on News Media Ethics and Diversity	
MKTG 6210	Marketing Research	
MKTG 6222	Digital Marketing	
MKTG 6226	Consumer Behavior	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
POLS 7334	Social Networks	
POLS 7341	Security and Resilience Policy	
PPUA 5262	Big Data for Cities	

## Additional Requirements

**Co-op Requirement:** Students must complete at least one co-op related to the certificate topic.

**Writing Requirement:** Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

## Program Credit/GPA Requirements

12 total semester hours required, including at least 6 semester hours of LAW courses and at least 6 semester hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

## United States Law, Graduate Certificate

The Graduate Certificate in United States Law offers an introduction to U.S. law for students who have completed their law degree in countries other than the United States. The asynchronous, online format provides flexibility for students seeking to expand their knowledge of law.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Foundational Course

Code	Title	Hours
LAW 6400	Introduction to U.S. Law and Legal System	3

## Electives

Code	Title	Hours
Complete at least 10 credits of electives from the following:		
LAW 6401	Contracts	10
LAW 6402	Torts	

LAW 6403	Constitutional Law
LAW 6404	Civil Procedure
LAW 6405	California Professional Responsibility
LAW 7000	Copyright
LAW 7001	Corporate Finance
LAW 7002	Intellectual Property
LAW 7004	Trademark
LAW 7005	Mergers and Acquisitions
LAW 7006	Secured Transactions
LAW 7007	Securities Regulation
LAW 7009	Intellectual Property and Technology Law
LAW 7010	Insurance Law
LAW 7011	Personal Income Tax
LAW 7012	Introduction to Business Organizations
LAW 7672	Data Privacy Compliance in the 21st Century

**Program Credit**

13 total hours required

**Women, Gender, Sexuality, and the Law, Graduate Certificate**

The Graduate Certificate in Women, Gender, Sexuality, and the Law, open to all JD students, gives students the opportunity to deepen their knowledge and develop their expertise in the area of women, gender, sexuality, and the law.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Law Courses**

Code	Title	Hours
Take at least two courses totaling at least 6 semester hours from the following list:		
LAW 7410	Domestic Violence Clinic	6
LAW 7488	Sexuality, Gender, and the Law	
LAW 7588	Reproductive Rights, Justice, and Health	
LAW 7651	Human Rights in the United States	
LAW 7664	Law and Inequality	
LAW 7679	Race and the Law	
LAW 7684	Anatomy of Autonomy	

**Required Non-Law Courses**

Code	Title	Hours
Take at least two courses totaling at least 6 semester hours from the following list:		
ECON 5292	Gender and Development Economics	6
INTL 5010	International Human Rights Law and Policy	
SOCL 7231	Sociology of Prejudice and Violence	
SOCL 7270	Sociology of Work and Employment	
SOCL 7273	Gender and Social Policy	
WMNS 5240	Feminist Resistance	

WMNS 6100	Theorizing Gender and Sexuality
WMNS 7100	Queer Theory: Sexualities, Genders, Politics

## Additional Requirements

**Co-op Requirement:** Students must complete at least one co-op related to the certificate topic.

**Writing Requirement:** Students must complete a piece of substantial writing that meets the requirements of the JD upper-level rigorous writing requirement and that has a clear connection to the certificate topic.

For additional information on requirements associated with this certificate, please consult the JD program's Student Information Handbook.

## Program Credit/GPA Requirements

12 total credit hours required, including at least 6 credit hours of LAW courses and at least 6 credit hours of non-LAW courses.

Students must receive a passing grade in all courses and satisfactorily complete all other requirements.

## Accelerated Degrees

The School of Law offers a PlusJD pathway that allows students to accelerate the attainment of the JD degree by applying School of Law coursework completed as an undergraduate toward both the undergraduate and JD degrees. Students pursuing the PlusJD pathway are expected to complete all undergraduate degree requirements before they begin their first-year JD courses, with the exception of requirements that may be fulfilled by these JD courses. Interested students should consult their advisor during their freshman or sophomore years. See the PlusJD program (<https://law.northeastern.edu/admissions/jd/application-process/plusjd/>) for additional information.

## Dual Degrees

- Law, JD / Accounting and Business Administration, MSAMBA (p. 315)
- Law, JD / Business Administration, MBA—Full-Time (p. 315)
- Law, JD / Criminology and Justice Policy, PhD (p. 828)
- Law, JD / Criminology and Criminal Justice, MS (p. 828)
- Law, JD / Public Health, MPH (p. 662)
- Law, JD / Public Policy, MPP (p. 829)
- Law, LLM / Business Administration, MBA—Full-Time (p. 315)

## Law, JD / Accounting and Business Administration, MSAMBA

The Northeastern University School of Law and the D'Amore-McKim School of Business offer a combined degree that results in a Juris Doctor and Master of Science in Accounting and Business Administration. Students without a previous accounting background study how to operate effectively in specialized fields such as taxation law, corporate finance, or mergers and acquisitions. Students have an opportunity to gain advanced legal expertise alongside future-forward accounting and business knowledge.

Our combined degree program is a full-time, four-year course of study. Students usually complete two years of the law curriculum, followed by 15 months of the combined accounting and business administration curriculum, before returning to finish their studies at the School of Law.

Students gain valuable work experience in law and public accounting before they graduate. They can make a real impact during two co-ops in legal departments, law firms, government agencies, judges' chambers, or other legal settings. Students also experience working as an accounting associate during the busy tax season through a corporate residency at Big 4 or other globally known accounting firms.

Students concurrently pursue the two degrees and may count 12 semester hours of nonlaw coursework from the accounting and business administration curriculum toward the law curriculum. The corporate residency at an accounting firm may fulfill the requirement for the third co-op required for the law curriculum. Students are encouraged to consult their law advisor to select accounting and business classes that satisfy JD requirements.

## Law, JD / Business Administration, MBA—Full-Time

The JD/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to operate in increasingly interdependent legal and business spheres. As new technology disrupts industries and data availability and sophisticated use shifts the business landscape, our JD/MBA (<https://damore-mckim.northeastern.edu/programs/jd-mba/>) students prepare to guide corporate-level strategy and become the leaders businesses need.

Our JD/MBA program is a full-time, four-year course of study that includes three semester-long co-op work experiences arranged through Northeastern Law. Students complete three years of law school, taking a break after either year one or two to complete a year of business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they may add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may count 9 semester hours of nonlaw coursework from the JD curriculum toward the interdisciplinary and elective requirements of the MBA degree and up to 12 semester hours from the MBA curriculum toward the JD degree. Students should work with their MBA advisor to select JD courses that will fulfill MBA requirements and with their law advisor to choose MBA courses that will satisfy JD requirements.

### Law, JD / Criminology and Justice Policy, PhD

The JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The dual degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the PhD degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the law school. Students will take criminology courses during semesters spent in SCCJ. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about PhD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

### Law, JD / Criminology and Criminal Justice, MS

The JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice, social equality, and societal well-being. The dual degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the MS degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the School of Law. Students will take criminology courses during semesters spent in the School of Criminology and Criminal Justice. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about MS requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

### Law, JD / Public Health, MPH

Northeastern University's School of Law and Bouvé College of Health Sciences offer a JD/MPH dual degree. Given the worldwide trend toward urbanization, the Master of Public Health (MPH) recognizes the growing need for professionals trained to respond to unique public health challenges and opportunities facing urban populations. The MPH program brings together interdisciplinary faculty (from the School of Law, D'Amore-McKim School of Business, College of Social Sciences and Humanities, Khoury College of Computer Sciences, and the Bouvé College of Health Sciences) with expertise in collaborating with diverse urban populations to offer students an opportunity to obtain practice-based knowledge, skills, and experience needed to address public health problems.

Up to 9 credit hours of coursework in the JD program may count toward the MPH, while up to 12 credit hours of coursework in the MPH program may count toward the JD. See the JD/MPH program page (<https://law.northeastern.edu/academics/programs/jd/dual-degrees/public-health-bouve/>) for more information.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

## Law, JD / Public Policy, MPP

The JD/Master of Public Policy (MPP) is designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-relevant experience through internships, small group capstone projects, and other interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students would apply to Northeastern's JD and MPP programs simultaneously. Those who apply and are admitted to both programs take MPP classes after completing their first year in the School of Law. Applicants may also be considered after they have enrolled in the JD program; interested JD students should consult the School of Law's Office of Academic and Student Affairs and the School of Public Policy and Urban Affairs graduate program director for more information.

Students enrolled in this dual-degree program will be able to count 8 JD credit hours toward their MPP degree and 12 MPP credit hours toward their JD degree. Students should consult advisors in each program if they have questions about which courses may be shared between degrees.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

## Law, LLM / Business Administration, MBA—Full-Time

### Law, LLM / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern University School of Law and the D'Amore-McKim School of Business to position students to harness legal and business skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, 20-month course of study. Students start taking classes in business school, take law courses next, and finish with business courses.

Students specialize their program by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by choosing an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

### Law, LLM—Experiential / MBA

The LLM/MBA dual degree is offered through a partnership between Northeastern Law and the D'Amore-McKim School of Business to position students to harness business and legal skills to serve their clients' needs. In the LLM/MBA (<https://damore-mckim.northeastern.edu/programs/llm-mba/>) program, students prepare to assume leadership positions where they'll navigate complex legal issues, answer their clients' calls for legal expertise, and engage as partners to develop new models for businesses, nonprofit organizations, and governments worldwide.

The LLM/MBA program is a full-time, two-year course of study that includes a semester-long co-op work experience arranged through Northeastern Law. During the course of their studies, students take classes in business school and the School of Law and complete a law co-op.

Students specialize their degree by selecting two in-demand business concentrations from the D'Amore-McKim School of Business. Or, they could add expertise in another professional area by selecting an interdisciplinary MBA x concentration in a highly relevant field offered through partnerships with other Northeastern colleges.

Students will concurrently pursue the two degrees and may be able to count up to 12 semester hours of coursework toward both degrees. Students should consult their MBA and LLM program advisors for more information.

## College of Professional Studies

Website (<https://cps.northeastern.edu>)

**Jared Auclair, PhD**, Dean of the College of Professional Studies

**Joseph Griffin, DMin, PMP ®**, Senior Associate Dean of Academic Affairs

**Sara Ewell, PhD**, Associate Dean of Faculty Affairs

**Corliss Thompson, PhD**, Associate Dean of Graduate School of Education

**Christopher Bolick, EdD**, Associate Dean of Graduate Programs

**Erin Clair, PhD**, Associate Dean of Undergraduate Programs

**Molly Smith, PhD** Associate Dean of University Pathway Programs

877.668.7727

617.373.2400

## Academic Policies and Procedures

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- Academic Resources (p. 831)
- Active-Duty Military Personnel (p. 831)
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## Academic Progression Standards

### Academic Progress/Standing

To be in good standing, a graduate student must continuously maintain a minimum cumulative grade-point average of 3.000 on a 4.000 scale and must also make continuous satisfactory academic progress. To make SAP, a student must earn at least 66% of their cumulative attempted credits. Nonmatriculated students are required to be in good academic standing to be allowed to register for any subsequent classes.

Students are responsible for reviewing their grades and academic standing at the end of each term through the Student Hub. If there are any discrepancies, students should immediately contact the instructor(s) directly. Students who want to appeal a grade have 30 calendar days from the date the grade is posted to do so.

### Academic Probation and Dismissal

Notation of academic probation appears on a student's internal record but not on their permanent transcript.

With exception as specified by the program, a graduate (nondoctoral) student is placed on academic probation if their cumulative GPA is below 3.000 and/or if they do not earn at least 66% of their cumulative attempted credits. The student is strongly encouraged to consult with their academic and career advisor to develop an individualized success plan to improve their academic standing. Otherwise, a registration hold may be placed on the student's account.

A student whose cumulative GPA remains below 3.000, and/or does not earn at least 66% of their cumulative attempted credits in the term of enrollment subsequent to the one after they were placed on academic probation, will be academically dismissed. A student who has been academically dismissed from the college is automatically dismissed from their program of study.

## **Dismissal Notification**

A student will be notified about their dismissal within one week following the end of the term and has the right to appeal the dismissal decision to the college's Academic Standing Committee if they can provide documented evidence supporting an appeal. The notification of dismissal will include the appeal deadline.

Students appealing a dismissal decision may not be eligible to enroll in classes the term following their dismissal to allow time for the appeal process.

Students are responsible for reviewing their grades and academic standing at the end of each term through the Student Hub.

## **Academic Resources**

### **Interactive Academic Integrity Checklist**

The Citation and Academic Integrity Checklist ([https://www.northeastern.edu/oepd/demo/CPS\\_AIRS/Citation%20and%20Academic%20Integrity%20Checklist/story\\_html5.html](https://www.northeastern.edu/oepd/demo/CPS_AIRS/Citation%20and%20Academic%20Integrity%20Checklist/story_html5.html)) is a tool students can use before they turn in every assignment to ensure that they have not accidentally committed any of the most common violations of the Academic Integrity Policy. Additionally, the IAIC contains links to examples of APA- and MLA-style formatting.

### **Global Student Success**

10 Belvedere  
617.373.2455  
[gss@northeastern.edu](mailto:gss@northeastern.edu)

Website (<https://international.northeastern.edu/gss/>)

Global Student Success is committed to supporting the success of international students at Northeastern University through cross-cultural, linguistic, and academic support services. We also partner with faculty, staff, and administrators to integrate global dimensions and cross-cultural understanding into the Northeastern experience.

### **International Tutoring Center**

Basement of Snell Library  
617.373.2455  
[gss@northeastern.edu](mailto:gss@northeastern.edu) ([gss@northeastern.edu](mailto:gss@northeastern.edu))

Website (<https://international.northeastern.edu/gss/>)

Tutors provide high-quality ESL writing instruction and tutoring for international students who need assistance with papers, assignments, TOEFL writing, and research projects. Students can meet one-on-one with an ESL tutor for 50-minute appointments. This is a free service for Northeastern University international students.

### **Online Writing Lab**

Website (<https://cps.northeastern.edu/academics/online-writing-center/>)

To provide students with guided writing support, the College of Professional Studies created the Online Writing Lab (<https://cps.northeastern.edu/academics/online-writing-center/>) as laboratory courses and attached them to six undergraduate courses and one graduate course. Students submit all of their essays to their writing specialists in the labs and then receive sophisticated revision and editing strategies to help them improve their essays before submission for a final grade. Students obtain strategies to help them focus, develop, edit, and refine their writing.

### **Tutoring Services**

Website (<https://cps.northeastern.edu/academic-resources/tutoring-services/>)

Tutoring can benefit skilled professionals and beginning students alike. Whether you're struggling with organic chemistry, working on a long paper, or putting the finishing touches on a presentation, Northeastern University offers many opportunities for you to enhance your academic work and professional skills through free one-on-one academic support on and off campus.

## **Active-Duty Military Personnel**

As a member of the Service Member Opportunity Colleges, the College of Professional Studies' academic residency requirement is different for active-duty service members. Active-duty service members are required to complete 30% of the graduate certificate/degree program at the College of Professional Studies.

## Attendance Verification

### "I Am Here" Process

After course registration, students are required to verify their intent to enroll in College of Professional Studies class(es) through the Student Hub (<https://me.northeastern.edu>) during the first week of each class start. This verification process is called "I Am Here." Students who fail to complete this process on time will be dropped from the class(es), which may impact their financial aid or international student visa eligibility.

Students are responsible for ensuring completion of the IAH process, which requires that they do not log out of the system early. Students who do not receive a "Successful Completion" message have not reached the end of the procedure and must start again. Sometimes it may take 24 hours before students can restart the procedure.

A student who registers for a course and completes the IAH process but does not officially drop the course by the deadline, regardless of their level of participation or attendance/nonattendance, is responsible for paying 100% of the tuition charges and applicable fees and the final earned grade. A student in this situation may earn an F grade that will be part of their permanent academic record.

Students registering for the first time after the start of classes will have access to complete IAH the following day.

Students who experience difficulty with the process or have questions should request support through the Registrar Services portal (<https://service.northeastern.edu/registrar/>).

## Completing Degree Requirements

### Graduate and Doctoral Degree Programs

To earn a graduate or doctoral degree, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; applicable thesis or dissertation; the residency requirement; and maintain a minimum cumulative grade-point average of 3.000 or as outlined by the specific program.

### Graduate Certificate Programs

To earn a graduate certificate, students must complete all courses as prescribed in the curriculum; the required number of credits as per the curriculum; the residency requirement; and maintain a minimum cumulative GPA of 3.000 or as outlined by the specific program.

### Time Limit on Courses

Graduate course credits earned in the academic program or accepted by transfer are valid for a maximum of seven years.

### Time Limit on Program Completion

- Graduate certificate students have up to three full years from the time of the first term of enrollment to complete the program.
- Master's degree students have up to seven full years from the time of the first term of enrollment to complete the program.
- Doctoral degree students, with the exception of the Transitional Doctor of Physical Therapy, have up to seven full years from the time of the first term of enrollment to complete the program.
- Transitional Doctor of Physical Therapy students have up to four full years from the time of the first term of enrollment to complete the program.

*Note:* The College of Professional Studies makes adjustments to its academic program offerings and curricula to stay current and to be able to offer students the most relevant courses and knowledge in the field. Examples of such changes include adding new programs, adding/adjusting course requirements, adding/adjusting courses, and adding/adjusting curriculum requirements.

When there is a change to a curriculum or program requirement, students already matriculated and actively enrolled in the program may continue to follow the program requirements at the time of matriculation or to follow the new curriculum/program requirements, unless it is otherwise specified by the academic program at the time of the announcement of said changes.

## Degrees, Majors, and Concentrations

### Change of Major/Program of Study

A graduate (nondoctoral) student matriculated in a certificate/degree program who would like to enroll in a different graduate program, after consulting with their academic advisor, must apply to the intended program by submitting the Change of Major form.

Previously awarded transfer credit awards are subject to change as a result of a program change. Students on financial aid or an international student visa are responsible for understanding the impact that results from a program change.

Doctoral students must consult with their program director or designee.

## Concentrations

Only Northeastern University-approved concentrations are noted on a student's official academic record. If a student pursues a customized specialization, no concentration will be noted on their official academic transcript. Students who wish to pursue a customized specialization must consult with their academic advisor and seek approval from the academic program.

### Full-Time Status

A graduate (nondoctoral) student is considered a full-time student if they are enrolled in 9 quarter hours of graduate credit for the quarter. An exception is made for students matriculated in master's degree programs that only require 4-credit courses, in which case full-time student status is attained with enrollment in 8 quarter hours of graduate credit for the quarter.

A doctoral student's full-time status is determined by the structure of the program.

Note that full-time status may be defined differently for federal loan purposes. International students have other considerations/requirements to maintain their visa eligibility.

### Course Load

Federal financial aid recipients must be enrolled in and successfully complete a minimum number of credits each term to maintain eligibility. For more information, contact your financial aid counselor.

### Course Overload

A maximum course load (different from full-time status) for a graduate (nondoctoral) student is 16 credits taken across a 12-week term, with no more than 8 credits per 6-week session.

To be eligible for a course overload (greater than 16 credits per 12-week term or greater than 8 credits per 6-week session), a graduate (nondoctoral) student must:

- Have a record of successful study with 12 or more credits a term at Northeastern University
- Have a minimum cumulative grade-point average of 3.500
- Provide a rationale to support the request

Students need to complete the appropriate form and return it to their career and academic advisor. Course overload is approved per term.

Each doctoral program has its own enrollment and course load requirements. Doctoral students who wish to seek a course overload must consult with the program director or designee.

## International Student Enrollment Requirements

### IMPORTANCE OF MAINTAINING F-1 STATUS

International students studying at Northeastern are responsible for maintaining compliance with U.S. federal regulations. Failure to maintain full-time enrollment, in accordance with these regulations, can result in consequences. Regular consultation with college academic advisors, as well as Office of Global Services international student advisors, is required before taking any action that may impact immigration status and educational endeavors in the United States.

### ACHIEVING FULL-TIME ENROLLMENT STATUS

Full-time enrollment status must be maintained by F-1 students throughout the academic year. To achieve full-time status, graduate students must be enrolled in 8–9 credits throughout each academic term. Students can consult with their college academic advisor prior to each term to develop a course schedule to maintain full-time status. F-1 students are expected to study on-ground and cannot enroll in an online course without first speaking to a college academic advisor to confirm eligibility. If approved, F-1 students who need to withdraw/drop from a course must withdraw/drop from the additional online course first and not from any of the on-ground core courses in order to maintain full-time status.

### COLLEGE OF PROFESSIONAL STUDIES ACADEMIC TERM

In CPS, each academic term in fall, winter, and spring is defined as a quarter term consisting of 12 weeks. Some courses are scheduled for the entire 12 weeks, while others are scheduled for either the first 6 weeks or the last 6 weeks (parts of a term). A full summer term consists of 8 weeks. Some courses are scheduled for the entire 8 weeks of a term, while others are scheduled for parts of a term.

### FINAL TERM

F-1 students are required to maintain full-time enrollment status, except in the final academic term of degree completion. If the course requirements for degree completion are less than 8–9 credits, they must be completed on-ground throughout the entire final term.

### ELIGIBILITY FOR SUMMER TERM OFF

All students, regardless of the term in which they begin studies, (e.g., CPS winter or spring quarter terms) are eligible to take the summer term off as their standard vacation term, as long as they confirm enrollment in the following fall term and they are not starting or ending their program of study in that same summer term.

## **Directed Study**

Directed studies are offered when a course is required for a student's program of study but said course is not available in a given academic term and there is immediacy for a student to complete said course. Academic deans/directors will make the decision if there is a compelling need to run a course as a directed study.

## **Independent Study**

Independent study is an opportunity for a degree student to work independently under the supervision of an instructor to undertake special research, literature review, or experimental study projects in areas related to their program of study that they cannot accomplish as part of a standard course in the curriculum. A degree student may take up to two independent studies. The work to be done for an independent study is usually crafted by the student, with faculty input. Independent studies are entirely optional and not needed to graduate. A completed Request for Independent Study form, signed by both the student and the faculty member, must be submitted to the academic program for review and approval.

## **Global Partnership Programs**

Students enrolled in a College of Professional Studies' global partnership or a combined major program are required to abide by the policies and procedures of both institutions or as specified in their program.

Combined major candidates must apply to graduate at each institution by following each institution's policies and procedures.

## **Graduate Campus**

Students enrolled in a Northeastern University graduate (regional) campus are also required to abide by the policies and procedures specific to that campus.

## **Graduation Requirements**

### **Graduation Procedures**

Only students who complete the graduation application process by specified deadlines will be considered for graduation and included in the graduation ceremony program. All qualified students must submit a graduation application in order to receive their diploma, regardless of whether they plan to attend the graduation ceremony.

Note important definitions: "Degree conferral date" and "graduation ceremony date" do not mean the same thing. Degree conferral date refers to the date of the university's official recognition of degree completion. For the purposes of the graduation application, that is accessed via the Student Hub. The "expected graduation date" is the same as the degree conferral date. Northeastern University confers degrees four times each academic year: winter, spring, summer, and fall. The graduation ceremony date is the date that the college hosts the annual graduation ceremony.

Doctoral candidates must be mindful of additional deadlines to complete their dissertation/thesis in time to be eligible for degree conferral and participation in a doctoral hooding and a graduation ceremony.

Each fall, the Office of the University Registrar sends an email notification to students who may be eligible to graduate that academic year about applying to graduate. This email notification informs and instructs students to complete the "Apply to Graduate" process, accessed via the Student Hub. Students are prompted to verify and provide critical information, e.g., spelling of the student's name on the diploma, intent to participate in the graduation ceremony, and mailing address.

An accurate EGD is required to gain access to the graduation application. The EGD is also used by clearinghouses to determine loan deferment schedules. If your EGD is not correct, contact your designated learner services specialist.

## **Diploma**

The following rules apply to the diploma.

- Information that will be printed on diplomas:
  - The major will be printed on diplomas for nonspecified degrees only (Master of Science, Master of Arts, Master of Professional Studies, Certificate of Advanced Graduate Study, Doctor of Philosophy).
  - Declared concentrations are not printed on diplomas.
  - Changes made to a student's name after the diploma has been printed may be subject to a \$50 fee and take more than one month to reprint.
  - Changes made to a student's degree information and name submitted after the program deadline will not be noted in the graduation ceremony program. If a diploma was previously printed, it will need to be reprinted and can take more than one month.

## **Master's Degree Admission Requirements**

Note that all master's degrees offered through the College of Professional Studies have the following admission requirements:

- Online application
- Statement of purpose (500–1,000 words)
- Professional resumé
- Official undergraduate transcript(s) noting conferral of a bachelor's degree
- Two letters of recommendation
- English-language proficiency proof (for non-native English-language speakers)
- TOEFL, IELTS, or TOEIC scores

Some programs have additional requirements.

The college reserves the right to rescind an offer of acceptance if the student is no longer considered in good academic or disciplinary standing between the time of acceptance and matriculation.

### New Student Orientation (On-Ground and Online)

New students taking courses on-ground receive an invitation to the on-ground orientation. The purpose of New Student Orientation is to provide information and tools for each student's success from the point of program entry to degree completion. All new students are expected to attend the on-ground orientation. If students cannot attend the on-ground orientation, they should thoroughly review the New Admitted Students (<https://cps.northeastern.edu/current-students/orientation/>) site.

### Personal Professional Enrichment (PPE)

Students interested in taking graduate-level (nondoctoral) courses for personal or professional enrichment need to complete an online application (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/>) as PPE students. Once approved, students will be able to register through the Student Hub (<https://me.northeastern.edu>).

- Students on PPE status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses while on PPE status may elect to apply to a graduate certificate or degree program by completing the formal application process (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/>). Up to two qualifying courses (or 8 credits) completed while on PPE status may be applied to the intended program of study. To be eligible, the minimum earned grade for the course(s) must be B.
- Students taking courses under PPE status are not eligible for financial aid.

PPE status is not an option for students seeking an F-1 visa.

### Readmission to Program

A new admission application is required of students whose studies are interrupted voluntarily for more than three years.

Students are expected to meet the requirements of the program curriculum current at the time of the approved readmission. If the program into which the student is seeking readmission is no longer offered, the student may apply to another program and must meet the admissions requirements for that program. Contact the Office of Admissions (<https://cps.northeastern.edu/admissions-aid/>) for assistance and to complete the admission application.

If readmitted, transfer credits that a student was previously awarded will be reevaluated following the transfer credit award rules current at the time of readmission. It is at the discretion of the academic program to determine applicability of courses previously completed.

### Reentry to Program

Application for reentry into any academic program is required of students whose studies are interrupted voluntarily for a period of one to three years. Students who are dismissed academically must wait at least one academic term before applying for reinstatement.

Students are expected to meet the requirements of the program curriculum current at the time of the approved reentry. If a student does not enroll in the term in which they were approved for reentry, they must follow the curriculum requirements for the term in which they resume coursework with approval. If a student waits for more than one year to resume their studies after being approved for reentry, they will have to apply for reentry again.

If the program into which the student is seeking reentry is no longer offered, the student may choose to enroll in another program if they meet the admissions requirements for that program. Contact the Office of Academic Advising (<https://cps.northeastern.edu/academic-resources/advising/>) for assistance and to complete the appropriate form.

## Registration and Taking Courses

### Course Registration

For course registration information, visit the College of Professional Studies webpage (<https://cps.northeastern.edu/current-students/registering-for-classes/>).

Course registration procedures are as follows:

- Newly accepted and returning students add or drop courses through the Student Hub any time during the registration period.
- Certificate- and degree-seeking students whose studies have been interrupted voluntarily for one to three years or more need to first apply for reentry through the Office of Academic Advising before registering for course(s).
- Global program students should consult with their program to determine if they need to register on their own or if the program will register them.

All students need to be mindful of the college's course add/drop policies and deadlines to register as early as possible with the intent to secure a spot in the preferred course and to avoid being charged in full for missing the course drop/withdrawal deadline.

### Auditing a Course

Graduate (nondoctoral) students are permitted to audit graduate (nondoctoral) courses, but they must complete the usual registration process and pay regular tuition fees. There is no reduction in fees for auditing.

An auditor may participate in class discussions, complete papers and projects, and take tests and examinations for informal evaluation. Regardless of the amount or quality of work completed, however, no academic credit will be granted at any time for audited courses. In addition, audited courses may not be used in the determination of enrollment status for financial aid purposes and do not count toward program completion.

The student's decision to audit a course must be communicated in writing to the Office of the University Registrar before the fourth class meeting for 12-week courses. For 4-, 6-, and 8-week courses, requests must be received by the second class meeting. No exception to this procedure may be approved without the authorization of the college's academic standing committee.

If approved, the student should inform the instructor of their status as auditor of the course.

### Course Selection and Planning

Students should refer to their degree audits for program curriculum information, to select courses, and to monitor their progress toward degree completion. Students should access their degree audits through the Student Hub or request an audit from their academic advisor. Degree audits are unofficial records of academic progress. Students are encouraged to consult with their academic advisor about their academic planning.

### Course Prerequisites

Course prerequisites are courses that are required to have been completed prior to enrolling in another course. Before registering for a course through the Student Hub, students, regardless of matriculation status, should consult the academic catalog to determine whether they have satisfied the course prerequisites.

### Course Corequisites

Course corequisites are courses that are required to be taken concurrently. Before registering for a course through the Student Hub, students, regardless of matriculation status, should read the course description to determine if there is a corequisite requirement and register for both courses.

### Retaking a Course

If a student wishes to improve their cumulative grade-point average by retaking a course, they may do so. Only the grade earned in the last attempt is used to compute the GPA while all grades remain part of the student's permanent academic record. A student is required to pay the normal tuition charges for all retaken courses. A student may not retake more than two nonrepeatable courses or 8 quarter hours of credit, whichever is greater, to satisfy the requirements of the degree.

Financial aid recipients must be mindful that retaking a course could impact their aid eligibility. Students with questions about this possible impact should contact their financial aid counselor.

### Course Waiver

A course waiver may be awarded to a student who has completed the equivalent course at an accredited institution other than the College of Professional Studies in the past five years. The waiver will exempt the student from completing the required course. The student will complete another course, as approved by the program, to satisfy the number of credits required for the program.

Doctoral students must consult with their academic program to determine if course waivers are permitted.

## Duration of Courses

Each full fall, winter, and spring term runs for 12 weeks. Each full summer term runs for 8 weeks.

Course durations are as follows:

- During the fall, winter, and spring terms, courses are scheduled for either 6 or 12 weeks.
- During the summer term, courses are scheduled for 4, 6, or 8 weeks.

## Course Add/Drop Policy

Refer to the academic calendar (<https://registrar.northeastern.edu/article/academic-calendar/>) for specific dates. Students should consult with their academic advisor before adding or dropping classes.

Students may add a 4-week or 6-week course within the first week of the course. For 8- and 12-week courses, students may add a course within the first 2 weeks of the course. Students who add a class during the add/drop period are responsible for all assignments missed prior to enrolling. Enrolled students are responsible to attend classes during the add/drop period, and absences will be held accountable to the instructor's attendance policy.

Students who drop a course before the add/drop deadline will not be charged for the course and will not have a W (withdrawal) on their transcript. Thereafter, students are responsible for 100% of the tuition charges and applicable fees and the earned grade will be on the students' permanent academic record. All such dates are specified in the academic calendar.

Students must add/drop courses using the Student Hub.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty adding or dropping a course should promptly request support through the Registrar Service Portal (<https://service.northeastern.edu/registrar/>). If it is determined that there is an issue with the student's Student Hub account or access, they need to contact the Service Desk at 617.373.4357 (HELP); [help@northeastern.edu](mailto:help@northeastern.edu).

Students with holds (e.g., financial, judicial) may have restricted access to add, drop, or withdraw from a course. In such instances, students are responsible for resolving the hold immediately and to meet the established course registration deadlines.

## Course Withdrawal Policy

Refer to the academic calendar (<https://registrar.northeastern.edu/article/academic-calendar/>) for specific dates. All students are encouraged to consult with their academic advisor prior to withdrawing from a course.

Students who withdraw from a course after the add/drop deadline and before the last day to withdraw will receive a W grade and will be responsible for 100% of the tuition charges and applicable fees. The W grade does not affect the calculation of the GPA but it does impact a student's academic progression, which may result in the student being placed on academic probation or dismissal.

Students must withdraw from courses using the Student Hub.

A reduction in a student's course load could affect a student's international student visa status or financial aid eligibility.

Students who experience difficulty withdrawing from a course should promptly request support through the Registrar Service Portal (<https://service.northeastern.edu/registrar/>). If it is determined that there is an issue with the student's Student Hub account or access, the student needs to contact the Service Desk at 617.373.4357 (HELP); [help@northeastern.edu](mailto:help@northeastern.edu).

Students who fail to withdraw from a course by the deadline, regardless of their level of class participation or attendance, are financially and academically responsible. A student's lack of participation/attendance will likely result in a final grade of F.

Withdrawals may impact a student's time to degree completion.

## Reinstatement after Academic Dismissal

A student who is academically dismissed from the College of Professional Studies is not eligible to register again for courses at CPS until they are approved for reinstatement. A student may apply for reinstatement after a minimum of one academic term if they can provide documented evidence supporting the application (e.g., completed two graduate courses with a grade of B or higher at another accredited college or relevant professional development opportunities during the one-term absence). The application must be made in writing by submitting the appropriate form and providing supporting documentation to the Office of Academic Advising (<https://cps.northeastern.edu/academic-resources/advising/>).

If reinstatement to the college is approved, a student is expected to meet the most current program admissions and curriculum requirements.

A student approved for reinstatement but who does not meet the admissions requirements for the intended program of study, or if the intended program of study is no longer available, may apply to another program.

Students reinstated must achieve good academic standing in the first term of reinstatement.

## Seeking More than One Certificate or Degree

A graduate (nondoctoral) student can be enrolled in only one graduate program at a time.

Graduate (nondoctoral) students seeking more than one certificate or degree after having completed a program should note that graduate credits earned toward:

1. A degree at any institution may not be used to satisfy the requirements of another graduate program.
2. A degree earned at the College of Professional Studies may be used to satisfy the requirements of a graduate certificate with a cap of 50% of the required credits of a graduate certificate, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the certificate.
  - a. If the same course is required in the degree and certificate programs and the student has exceeded the maximum number of credits that can be applied in the certificate program, they may request a course substitution to be permitted to take another course instead of repeating the course.
3. With specified exception, a certificate earned at the College of Professional Studies may be used to satisfy the requirements of a graduate degree, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.
4. A certificate earned at the College of Professional Studies may be used to satisfy the requirements of a second certificate with a cap of one course of no more than 4 credits, if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the certificate.
  - a. If the same course is required in both certificate programs and the student has exceeded the maximum number of credits that can be applied in the second certificate program, the student will request a course waiver to be permitted to take another course instead of repeating the course. See Course Waiver (p. 836) section.
5. A certificate earned at another accredited institution may be accepted as transfer credits to satisfy the requirements of a graduate degree with a cap of four 3-credit courses or three 4-credit courses (no more than 12 credits), if the contents are determined to be applicable per the program director and if the credits were earned within seven years of pursuit of the degree.

A graduate (nondoctoral) degree student who wishes to pursue a graduate certificate concurrently may seek admission in the certificate program by the end of their first term of matriculation in the degree program. Courses that satisfy requirements for both the degree and certificate will count for each.

- When the certificate is identical to a concentration in a degree program, only the certificate credential will be earned. The student's transcript will not indicate completion of a concentration.

## Special Student Status

Graduate applicants to the College of Professional Studies may be eligible to take up to 16 graduate (nondoctoral) quarter hours toward their program while completing the formal application process by seeking special student status (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/graduate-special-student-status/>).

- Students taking courses under special student status are expected to satisfy applicable course prerequisites before enrolling in a course.
- Students taking courses under special student status are not eligible for financial aid.
- Special student status does not guarantee acceptance.
- The maximum number of courses students may take under special student status is two. After completing two courses, students will be blocked from further course registration until they have been officially accepted into a program.

The following programs are not available for special student status: Master of Arts in Teaching (MAT); Master of Education, Special Education Concentration; Doctor of Education; Doctor of Law and Policy.

Special student status is not an option for students seeking an F-1 visa.

## Student Evaluation of Courses

Students play a critical role in Northeastern University's commitment to quality teaching and academic excellence when they participate in the evaluation of courses, an online survey students complete anonymously. Students are expected to participate in the course evaluation process with constructive feedback that is relevant to teaching and course content.

Students may access the course evaluation summary results from previous terms via the Student Hub (<https://me.northeastern.edu/>). Courses with three or fewer students enrolled are not surveyed.

## Transfer Credit Policies

All graduate transfer credit awards are made on a case-by-case basis. Transfer credit awards are made for eligible courses successfully completed at regionally and programmatically accredited institutions. The Council for Higher Education Accreditation provides information about the organizations responsible for these two forms of accreditation. Official transcripts from all institutions should be sent directly to the College of Professional Studies Office of Admissions at the time of application.

Students seeking transfer credits earned at institutions outside the United States should submit an official English evaluation completed by an approved credential evaluator. Course descriptions and/or syllabi also should be translated into English and submitted to the College of Professional Studies Office of Admissions.

A maximum of 12 quarter hours or four 3-credit courses or three 4-credit courses obtained at another institution may be accepted as transfer toward the degree, provided the credits consist of work taken at the graduate level for graduate credit, carry minimum grades of B (or 3.000 on a 4.000 scale), have been earned at an accredited institution or equivalent, and have not been used toward any baccalaureate or advanced degree or certificate of advanced graduate study at another institution.

Transfer credits must be no more than five academic years old at the time the student is admitted to graduate study. Courses older than five years will be accepted only in rare circumstances.

## Prior Learning Assessment

Students may be eligible for prior learning assessment credit if they have accrued a foundation of knowledge and skills equivalent to the content of courses offered by the College of Professional Studies.

Awarded credits are incorporated into a student's degree plan as transfer credits and are subject to Northeastern University's residency requirement. PLA credit is limited to a maximum of 12 quarter hours for graduate students. Acceptable credits for PLA review are credits from certificates, training, and a portfolio review of prior work experience. As part of consideration for PLA credits, faculty will evaluate and map learning outcomes and achievement in alignment with NECHE accreditation requirements.

Potential PLA credits should be considered and discussed as part of a student's transfer credits at the time of enrollment. Interested students should contact their academic advisor for more information.

## Graduate Certificate Transfer Credit Policies

- A maximum of 4 quarter hours of transfer credit

## Master's Degree Transfer Credit Policies

- A maximum of 12 quarter hours of transfer credit

## Doctoral Degree Transfer Credit Policies

- A maximum of 9 quarter hours of transfer credit for Doctor of Education students
- A maximum of 8 quarter hours of transfer credit for Transitional Doctor of Physical Therapy students
- No transfer credit is awarded for students in the Doctor of Law and Policy program

## Doctoral Degree Programs

Designed to provide you with the skills and knowledge needed to succeed, Northeastern University's College of Professional Studies doctoral programs are guided by industry-leading faculty and built on a foundation of experience in policy, research, and administration. Reach the top of your field with coursework and research projects that are relevant to today's professional on a schedule that fits your lifestyle.

## Programs

### Doctor of Education (EdD)

- Education (p. 839)

### Doctor of Law and Policy (DLP)

- Law and Policy (p. 843)

## Education, EdD

The Doctor of Education (EdD) empowers students to bring about solutions to complex problems of practice in their local context, while leveraging a global network to magnify students' boundless experiential learning to build a more socially just world. The Dissertation in Practice, the culminating component of the degree, is designed to prepare leaders who can construct and apply knowledge to transform their organizations and communities through laboratories of practice where students implement change and then measure and analyze the impact to improve their professional practice.

This knowledge is the start of students' potential for meaningful change work. Students magnify their ability to generate socially just change by leveraging Northeastern University's global network of students, alumni, employers, and entrepreneurs.

## **Admission Requirements**

Note that all Doctor of Education degrees offered through the College of Professional Studies have the following admission requirements:

- Online application
- Academic transcripts (undergraduate **and** graduate)
- Admissions statement (1,000–1,200 words)
- Minimum of three years of professional work experience in a related field
- Professional resumé
- Faculty recommendation
- Two professional recommendations
- English-language proficiency proof (for non-native English-language speakers)

### **HIGHER EDUCATION ADMINISTRATION CONCENTRATION**

The Higher Education Administration concentration provides an opportunity for experienced higher education professionals to examine new and deepen previous understanding of practices within all sectors of postsecondary education. Sectors examined include community colleges, four-year colleges, for-profit institutions, and research universities. The increased globalization of higher education is addressed throughout the program. The concentration courses allow experienced higher education professionals to advance their professional practice by developing and deepening their understanding of the roles of colleges and universities in our society. Specifically, this concentration provides the opportunity to:

1. Be well-grounded in areas essential to understanding and articulating the educational roles of colleges and universities that include:
  - Cultural, ethical, and societal issues that affect higher education
  - History of higher education worldwide
  - Organization, governance, leadership, and administrative theories and practices
  - Higher education finance, law, and planning
2. Develop skills and knowledge for establishing and sustaining initiatives in higher education.
3. Address the challenge of ensuring educational equity through an evaluation of the roles, functions, and interrelationships among a college's or university's major constituents, including students, faculty, staff, and alumni.
4. Conduct research at the worksite that contributes to the resolution of an urgent and complex problem of practice.

### **INNOVATIVE TEACHING AND LEARNING**

The Innovative Teaching and Learning concentration focuses on transforming education through innovation, justice, and policy by providing engaging opportunities for current and aspiring teaching and learning specialists working in a variety of educational spaces. In a global, ever-changing educational environment, cultivating strong teaching and learning specialists is critical to building strong, safe, and equitable learning spaces. The concentration focuses on teaching and learning both inside and outside the bounds of P–20 schools. Through a focus on developing and leading innovative curriculum and professional development, the coursework and programmatic experiences are experiential—offers opportunity for learning and growth in connection with partners in the field; modular—develops specialized professional knowledges; and justice-oriented—enables an understanding of change processes that deconstruct systemic injustice at all educational levels. Specifically, the Innovative Teaching and Learning concentration provides the opportunity to:

- Develop the ability to improve teaching and learning through innovation
- Design classroom, curriculum, and professional development that lead to greater achievement and equity
- Design systems to address race, class, and gender inequities in education
- Leverage partnerships with business and community to expand networks and experiences

### **INTEGRATIVE STUDIES CONCENTRATION**

The Integrative Studies Concentration provides an opportunity for students to design a program of study that includes the program-required foundation and research courses, concentration courses from any EdD concentration, and electives from the Doctor of Education or Doctor of Law and Policy programs.

### **TRANSFORMATIVE SCHOOL LEADERSHIP**

The Transformative School Leadership concentration provides innovative opportunities for experienced education professionals who are current and aspiring leaders of early childhood centers, public or private schools, or school districts. In a global, ever-changing educational environment, cultivating strong educational leaders is critical to building strong, safe, and equitable learning spaces. In preparing to meet complex and nuanced educational challenges, school leaders need to be knowledgeable and innovative, capable of facilitating the generation and advancement of new ideas and strategic initiatives, and equipped to shape the needs of education in K–12, higher education, organizational contexts, and beyond. Through deeper engagement with these components, the Transformative School Leadership concentration prepares students to lead and transform educational spaces P–12. The coursework and programmatic experiences are experiential—offers opportunity for learning and growth in connection with partners in the field; modular—develops specialized professional knowledges; and justice-oriented—enables an understanding of change processes that deconstruct systemic injustice at all educational levels. Specifically, this concentration provides the opportunity to:

- Develop the ability to shape a vision of academic success for all students
- Develop leadership capacity in others
- Manage people, data, and processes to develop innovative skills and knowledge
- Design systems to address race, class, and gender inequities in education
- Leverage partnerships with business and community to expand networks and experiences

### **WORKPLACE LEARNING**

The Workplace Learning concentration embraces the value of equity through instruction grounded in the concept of enabling people of all backgrounds, networking across the globe, to achieve their potential and the belief that social issues matter in workplace learning and development. This doctoral concentration in Workplace Learning helps learning professionals gain a deeper understanding of, recognize, and influence real-life social inequalities marginalized populations face in the workplace. The concentration courses allow experienced learning professionals to advance their professional practice by developing and deepening their understanding of workplace learning, organizational dynamics, learning strategy, and ethics. Specifically, this concentration provides the opportunity to:

- Articulate the issues facing workplace learning
- Develop skills and knowledge for establishing and sustaining initiatives and partnerships in workplace learning
- Conduct research in the workplace that contributes to the resolution of an urgent and complex problem of practice

*Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal CAGS Education Leadership Management (<https://catalog.northeastern.edu/graduate/professional-studies/doctoral-degree-programs/education-leadership-management-cags/#text>). Note that no students will be admitted directly into the CAGS Education Leadership Management (<https://catalog.northeastern.edu/graduate/professional-studies/doctoral-degree-programs/education-leadership-management-cags/#text>) program.*

### **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* A minimum of 51 quarter hours must be taken at the College of Professional Studies.

#### **Required Foundation Courses**

Code	Title	Hours
EDU 7207	Foundations of Doctoral Studies	3
EDU 7218	Leadership for Social Justice	3
EDU 7219	Foundations of Collaboration, Leadership, and Change	3

#### **Required Research Courses**

Code	Title	Hours
EDU 7225	Fundamentals of Research	3
EDU 7226	Research Design	3
EDU 7294	Advanced Research Design 1	3
EDU 7295	Dissertation in Practice Seminar	3
EDU 7310	Advanced Research Design 2	3

#### **Concentrations**

Complete one of the following concentrations:

- Higher Education Administration
- Innovative Teaching and Learning
- Integrative Studies

- Transformative School Leadership (p. 843)
- Workplace Learning (p. 843)

## Dissertation in Practice

Code	Title	Hours
EDU 8750	Proposal, Action Step, and Evaluation	6
EDU 8760	Action Research Results and Dissemination	6

**Residency Requirement:** Each student is required to attend two residency events. Dates and other event information are released annually. Seattle and Charlotte students will satisfy residency requirements through regional campus hybrid coursework.

## Elective List

Complete four courses from the EDU 7000 level. Below is a list of courses regularly offered as electives within the Doctor of Education program.

Code	Title	Hours
EDU 7227	The Power of Experiential Learning	
EDU 7228	Bringing Experiential Learning, Assessment, and Reflection to Life	
EDU 7229	The Experiential Learning Leader	
EDU 7230		
EDU 7245		
EDU 7251	Student Engagement in Higher Education	
EDU 7256	Financial Decision Making in Higher Education	
EDU 7260	Comparative International/Global Higher Education	
EDU 7261	International Student Markets	
EDU 7266	Contemporary Issues in Community Colleges	
EDU 7274	Doctoral Seminar in Organizational Leadership and Communication	
EDU 7314	Collaboration and Networks in Educational Leadership	
EDU 7317	Collaboration and Networks in Teaching and Learning	
EDU 7510	Data-Driven Decision Making	
EDU 7511	Digital Workplace Learning	

Doctor of Education Advanced Graduate Credit (<https://cps.northeastern.edu/admissions-aid/graduate-admissions/graduate-transfer-credit/doctor-of-education-advanced-graduate-credit/>)

## Program Credit/GPA Requirements

60 total quarter hours required

Minimum 3.000 GPA required

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## HIGHER EDUCATION ADMINISTRATION

Code	Title	Hours
EDU 7204	Global and Historical Perspectives on Higher Education	3
EDU 7250	Organizational Systems and Institutional Governance	3
EDU 7253	The Legal Environment of Higher Education	3
EDU 7258	Strategic Management in Higher Education	3

## INNOVATIVE TEACHING AND LEARNING

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7315	Landscape of Teaching and Learning	3
EDU 7316	Designing Transformative Curriculum and Professional Development	3

## INTEGRATIVE STUDIES

Code	Title	Hours
Required Courses	Complete EDU courses from any other program concentration.	12

**Elective Courses**

Complete EDU 7000 courses from the program elective list and any LWP 7000-level course.

12

**TRANSFORMATIVE SCHOOL LEADERSHIP**

Code	Title	Hours
EDU 7217	Educational Systems: The Dynamics of Policy, Power, and Practice	3
EDU 7311	Designing Educational Systems for Justice and Equity	3
EDU 7312	Landscape of Educational Leadership	3
EDU 7313	Leading and Managing Change	3

**WORKPLACE LEARNING**

Code	Title	Hours
EDU 7501	Designing Workplace Learning	3
EDU 7502	The Dynamics of Workplace Learning	3
EDU 7503	Leading the Learning Strategy	3
EDU 7504	Diversity, Equity, and Inclusion in Workplace Learning	3

**Law and Policy, DLP**

Public servants, executives, and managers operate in an increasingly complex global environment. A doctoral education seeks to provide the policy, analytic, and research skills necessary to advance one's career.

Developed jointly by the College of Professional Studies and Northeastern's Public Policy program, the Doctor of Law and Policy program (DLP) is designed for experienced professionals who are interested in the origins, development, implementation, and analysis of legal and public policy decisions in government and related institutions. The program prepares students to advance their careers within a variety of fields while focusing their thesis research on a precise law and policy topic.

Students undertake the DLP in order to understand the ways in which public and related institutions formulate and execute policy. Students have the opportunity to develop the ability to interpret and assess the research of others, to acquire skills as researchers, and to communicate their knowledge to a wide range of audiences. Those who successfully complete the degree are equipped to bring their skills and knowledge to senior policy and management positions in government, nonprofit agencies, research organizations, consulting firms, and corporations.

The DLP program is structured so course work and the doctoral thesis can be completed in two years. Classes meet one weekend per month in Boston, and the learning continues online throughout the rest of the month.

Northeastern University also offers a traditional PhD in Public Policy. To learn more, visit the Public Policy program website (<https://cssh.northeastern.edu/policyschool/program/phd-in-public-policy/>).

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
LWP 6118	Historical Foundations of American Law	3
LWP 6119	Current Law and Policy Debates: Our Nation's Capital and Beyond	3
LWP 6120	Law and Legal Reasoning 1: Legal Reasoning, Methods, and Research	3
LWP 6401	The Policymaking Process	3
LWP 6424	Research Methods	3
LWP 6121	Law and Legal Reasoning 2	3
LWP 6402	Law and Policy Concepts 2: Strategizing for Public Policy	3
LWP 6423	Qualitative Methods	3
LWP 6122	Law and Legal Reasoning 3	3

LWP 6403	Law and Policy Concepts 3: Policy Case Studies	3
LWP 6420	Quantitative Methods	3
LWP 6123	Law and Legal Reasoning 4	3
LWP 6410	Economics for Policy Analysis	3
LWP 6404	Evaluation Research	3
LWP 6431	Political and Moral Ethics and Dilemmas	3
LWP 6500	Doctoral Research Design 1	3
LWP 6450	Public Policy Theory and Practice 1	3
LWP 6501	Doctoral Research Design 2	3
LWP 6451	Public Policy Theory and Practice 2	3
LWP 6502	Doctoral Research Design 3	3
LWP 6452	Public Policy Theory and Practice 3	3
LWP 6503	Doctoral Research Design 4	6

## Program Credit/GPA Requirements

69 total quarter hours required

Minimum 3.000 GPA required

## Master's Degree Programs

Our master's degree programs are grounded in theory and applied in practice, representing today's in-demand fields like education, technology, project management, and regulatory affairs. Gain the knowledge and credentials that employers seek with courses designed to accommodate your life. Programs are led by industry professionals and are offered both full- or part-time online, on campus, or in a hybrid format.

### Programs

#### Master of Arts (MA)

- Security and Intelligence Studies (p. 845)

#### Master of Arts in Teaching (MAT)

- Teaching, Elementary Licensure (p. 846)
- Teaching, Secondary Licensure (p. 847)

#### Master of Education (MEd)

- Education (p. 850)
- Higher Education Administration (p. 852)

#### Master of Professional Studies (MPS)

- Analytics (p. 853)
- Applied Logistics (p. 855)
- Applied Machine Intelligence (p. 858)
- Digital Media (p. 860)
- Digital Media—Connect (p. 862)
- Informatics (p. 865)
- Insurance Analytics and Management (p. 867)
- Learning Experience Design and Technology (p. 869)

#### Master of Science (MS)

- Commerce and Economic Development (p. 870)
- Corporate and Organizational Communication (p. 872)
- Global Studies and International Relations (p. 876)
- Human Resources Management (p. 879)
- Nonprofit Management (p. 882)
- Organizational Leadership (p. 886)
- Project Management (p. 889)
- Regulatory Affairs (p. 892)

## Master of Sports Leadership (MSLD)

- Sports Leadership (p. 894)

### Security and Intelligence Studies, MA

The Master of Arts in Security and Intelligence Studies aims to prepare professionals working in the security industry, and other related industries, for success as leaders in the field of security in an ever-changing, challenging global environment. This program will serve the mounting need for talent in the security field in both the government and private sectors.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CJS 6125	National Security—Law and Policy	3
HLS 6000	Introduction to Homeland Security	3
HLS 6010	Contemporary Threats to Homeland Security	3
SIA 6040	The Intelligence Community and Interagency Collaboration	3
SIA 6140	Civil Liberties and Security	3
SIA 6980	Capstone	3

### Concentrations

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list.

- Corporate Security Management (p. 845)
- Homeland Security and Emergency Management (p. 846)
- Strategic Intelligence and Analysis (p. 846)

### Electives

Code	Title	Hours
Complete courses in the following subjects areas at the 5000 level or above to reach 45 quarter hours: CJS, GST, HLS, LDR, PJM, SIS.		

### Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

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### CORPORATE SECURITY MANAGEMENT

Code	Title	Hours
CJS 6430	Risk Management	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
SIA 6150	Corporate Security and Investigations	3
SIA 6160	Information Systems Policy	3

**HOMELAND SECURITY AND EMERGENCY MANAGEMENT**

Code	Title	Hours
HLS 6040	Critical Infrastructure and Protection	3
HLS 6060	Strategic Planning and Budgeting	3
HLS 6080	Continuity of Operations and Planning	3
HLS 6150	Essentials of Emergency Management	3
HLS 6160	Advanced Emergency Management	3

**STRATEGIC INTELLIGENCE AND ANALYSIS**

Code	Title	Hours
SIA 6010	Intelligence Operations Management	3
SIA 6020	Globalization and Intelligence Issues	3
SIA 6030	Intelligence Analysis and Policy Relationship	3
SIA 6050	All-Source Intelligence	4
SIA 6170	Counterintelligence	3

**Elementary Education, MAT**

Designed for Massachusetts-based aspiring teachers and career changers, the Master of Arts in Teaching in Elementary Education (MAT)<sup>1</sup> offers an appreciation for and an understanding of the diverse educational needs, social concerns, and cultural values of today's elementary and secondary schools. This graduate degree in teaching seeks to enhance your foundational skills, broaden your perspectives, and strengthen your ability to inspire and educate. The master's degree, which includes a full term of student teaching and prepracticum experiential fieldwork, seeks to produce graduates well positioned to make a meaningful impact in their school, in their community, and in the lives of their students.

The Elementary MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional coursework to earn either endorsement for an additional license in special education (Teacher of Students of Moderate Disabilities, PreK–8) or endorsement for an additional license in ESL (Teacher of English as a Second Language, Pre-K–6) to the Massachusetts Department of Elementary and Secondary Education. Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

A formal application for approval or placement of field-based experiences for prepracticum and practicum requirements must be filed with the Office of Licensure and Field Experience before a student may enroll in a course requiring fieldwork. Deadline for fall placements and approvals must be completed by April 1st (of the previous spring quarter), October 1st for winter placements and approvals, and February 1st for spring placements and approvals.

<sup>1</sup> The MAT Elementary (grades 1–6) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
EDU 6051	Introduction to Social Justice in Educational Settings	4
EDU 6086	Foundations of Literacy Development and Instruction	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity <sup>1</sup>	4
EDU 6154	Inquiry in the Sciences and Humanities	4

EDU 6155	Inquiry in Mathematics <sup>2</sup>	4
EDU 6183	Collaborative Strategies for Effective Classroom Management	3
Complete one of the following:		
<i>For students pursuing emergency elementary teaching licenses or ESL+ licensure in Massachusetts</i>		
EDU 6513	Sheltered English Immersion in the General Classroom	4
<i>For students not pursuing emergency elementary licenses and ESL+ licensure in Massachusetts</i>		
EDU 6185	English-Language Learners in the General Education Classroom	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6866	Teaching Practicum and Seminar	6

<sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

<sup>2</sup> For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

## Program Credit/GPA Requirements

45 total quarter hours required (additional hours may be required for endorsement for Massachusetts licensure)

Minimum 3.000 GPA required

### ELEMENTARY MAT+ SPECIAL EDUCATION

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School <sup>1</sup>	4
EDU 6429	Variations in Child and Adolescent Development	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

<sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

### MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6310	Literacy Development and the Academic Domains <sup>1</sup>	4
EDU 6429	Variations in Child and Adolescent Development	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice <sup>2</sup>	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

<sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

<sup>2</sup> For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

## Secondary Education, MAT

Designed for Massachusetts-based aspiring teachers and career changers, the Master of Arts in Secondary Education (MAT)<sup>1</sup> offers an appreciation for and an understanding of the diverse educational needs, social concerns, and cultural values of today's secondary schools.

This MAT in Secondary Education seeks to enhance your foundational skills, broaden your perspectives, and strengthen your ability to inspire and educate. This master's degree, which includes a full term of student teaching, seeks to produce graduates well positioned to make a meaningful impact in their school, in their community, and in the lives of their students.

- Gain political, social, and historical perspectives on education
- Explore the richly complex environments of schools and communities
- Develop a working understanding of teaching and learning in diverse settings
- Investigate how humans learn, acquire knowledge, and make sense of their experiences
- Examine theories of teaching and explore how best to teach for understanding and learning achievement
- Research methods and materials, pedagogies, and assessment strategies that foster integrated learning

Options for endorsement to licensure include history, 5–12; biology, 8–12; social science, 5–12; English, 5–12; mathematics, 8–12; chemistry, 8–12; earth and space science, 8–12; political science/political philosophy, 8–12; or physics, 8–12. Determination of program of study to be made by faculty review at time of admission.

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional coursework to earn either endorsement for an additional license in special education (Teacher of Students of Moderate Disabilities, 5–12) or an endorsement for an additional license in ESL (Teacher of English as a Second Language, 5–12) to the Massachusetts Department of Elementary and Secondary Education.

A formal application for approval or placement of field-based experiences for prepracticum and practicum requirements must be filed with the Office of Licensure and Field Placement before a student may enroll in a course requiring fieldwork. Deadline for fall placements and approvals must be completed by April 1 (of the previous spring quarter), October 1 for winter placements and approvals, and February 1 for spring placements and approvals.

- <sup>1</sup> The Master of Arts in Teaching Secondary Education (grades 5–12 or 8–12 dependent on content area) has been approved at the initial licensure level by the Massachusetts Department of Elementary and Secondary Education.
- 2 For students who do not pass or complete their Gateway Performance Task I in this course, complete Project (EDU 6995) to meet programmatic and endorsement requirements.
- 3 For students who do not pass or complete their Gateway Performance Task II in this course, complete Project (EDU 6995) to meet programmatic and endorsement requirements.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
EDU 6051	Introduction to Social Justice in Educational Settings	4
EDU 6064	Curriculum and Assessment	4
EDU 6101	Critical Issues in Education: Past and Present	2
EDU 6102	Reflection, Community Engagement, and Agency in Education	2
EDU 6104	Child and Adolescent Development, Learning, and Teaching	4
EDU 6107	Inclusion, Equity, and Diversity <sup>1</sup>	4
EDU 6162	Language, Culture, and Literacy in Middle and High Schools	4

Complete one of the following:

*For students pursuing emergency secondary teaching licenses or ESL+ licensure in Massachusetts*

EDU 6513	Sheltered English Immersion in the General Classroom
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*For students not pursuing emergency secondary licenses and ESL+ licensure in Massachusetts*

EDU 6185	English-Language Learners in the General Education Classroom
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Complete the following:

EDU 6183	Collaborative Strategies for Effective Classroom Management	3
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EDU 6866	Teaching Practicum and Seminar	6
Complete one of the following:		4
EDU 6122	Teaching the Language Arts <sup>2</sup>	
EDU 6124	Teaching History and the Social Sciences <sup>2</sup>	
EDU 6127	Teaching Science <sup>2</sup>	
EDU 6129	Teaching Mathematics <sup>2</sup>	

- <sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.
- <sup>2</sup> For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

## Elective Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		
EDU 6184	Interdisciplinary Foundations	
EDU 6300	Introduction to Language and Linguistics	
EDU 6425	Special Education: Role of Special Educators in an Inclusive School	
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	
EDU 6429	Variations in Child and Adolescent Development	
EDU 6438	Teachers as Curriculum Leaders	
EDU 6465	Critical and Creative Thinking	
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	
EDU 6569	Differentiated Instruction and Assessment in Mathematics	

## Program Credit/GPA Requirements

45 total quarter hours required (additional hours may be required for endorsement for Massachusetts licensure)

Minimum 3.000 GPA required

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### LOOKING TO DEEPEN YOUR KNOWLEDGE AND EXPERTISE?

The MAT+ offers qualifying students the opportunity to complete a MAT with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (Teacher of Students of Moderate Disabilities, pre-K–8 or 5–12) or an additional license in ESL (Teacher of English as a Second Language, pre-K–6 or 5–12).

### MAT+ IN SPECIAL EDUCATION

The MAT+ provides qualifying students with the opportunity to complete a Master of Arts in Teaching (MAT) with further study in a selected area of expertise. Currently, students can take additional coursework to earn either an additional license in special education (Teacher of Students of Moderate Disabilities, pre-K–8 or 5–12) or an additional license in ESL (Teacher of English as a Second Language, pre-K–6 or 5–12). Teacher candidates may also plan a program of study that allows for triple licensure in consultation with the program director.

The special education course requirements are:

Code	Title	Hours
EDU 6425	Special Education: Role of Special Educators in an Inclusive School <sup>1</sup>	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

- <sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

### MAT+ IN ENGLISH AS A SECOND LANGUAGE (ESL)

This Commonwealth of Massachusetts-approved MAT+ program consists of five courses, some of which may be taken as electives in the MAT program.

The English as a Second Language course requirements are:

Code	Title	Hours
EDU 6300	Introduction to Language and Linguistics	4
EDU 6310	Literacy Development and the Academic Domains <sup>1</sup>	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice <sup>2</sup>	4
EDU 6874	Practicum, Portfolio, and Panel Review	4

<sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

<sup>2</sup> For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

## Education, MEd

### ESL Instruction Concentration

The English as a Second Language Instruction concentration allows teachers with an initial teacher license in Massachusetts to earn an additional license in English as a Second Language (grades PreK–8 or 5–12). The coursework engages graduate students in subject-based knowledge and field experiences. There is a need for more Massachusetts teachers licensed in English as a Second Language, which makes this concentration an essential pathway for teachers to deepen their expertise to meet the broad range of students they work with.

### Learning and Instruction Concentration

The learning and instruction concentration in the MEd program is designed for teachers and leaders in K–12-focused schools and community organizations that want to lead change and expand equity in their classrooms, schools, or educational communities. Graduate students examine the impact of local, national, and global changes on educational policy and practice. They deepen their ability to effectively engage diverse students in meaningful learning through coursework focused on curriculum and assessment, teaching and learning, and experiential education.

Students pursuing Massachusetts ESL, preK–12, initial licensure: This program meets Massachusetts Department of Elementary and Secondary Education standards and competencies for licensure as an English as a Second Language Teacher, pre-K–6 and 5–12.

### Special Education Concentration

Demand for graduate-level-prepared special education practitioners is on the rise, driven by heightened degree requirements and a shortage of licensed, qualified teachers. In response, the College of Professional Studies is pleased to offer the Master of Education with Concentration in Special Education. Designed for educators who are licensed in Massachusetts at the initial or professional level in another discipline, this innovative master's degree program seeks to prepare you to meet the special needs of students across a variety of school environments.

This program meets Massachusetts Department of Elementary and Secondary Education standards and competencies for licensure as a Teacher of Students with Moderate Disabilities, preK–8 and 5–12.

In this advanced program, you have an opportunity to explore specific topics on modifying curriculum, designing curriculum-based assessments, managing severe behaviors, developing individualized education programs, leveraging community resources, and improving literacy. As a result, you have an opportunity to enhance your ability to meet the needs of a diverse student population and to achieve the competencies required for this specialized license.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Introduction to Social Justice in Educational Settings	4

## Concentration

Complete one of the following concentrations. Students must successfully complete all licensure courses with a grade of B or better in order to progress into their next licensure course.

- ESL Instruction (p. 851)
- Learning and Instruction
- Special Education

## Program Credit/GPA Requirements

45 total quarter hours required (additional hours may be required for endorsement for Massachusetts licensure)  
Minimum 3.000 GPA required

### CONCENTRATION IN ESL INSTRUCTION

Code	Title	Hours
<b>Required Courses</b>		
EDU 6185 or EDU 6513	English-Language Learners in the General Education Classroom Sheltered English Immersion in the General Classroom	4
EDU 6300	Introduction to Language and Linguistics	4
EDU 6310	Literacy Development and the Academic Domains <sup>1</sup>	4
EDU 6319	How People Learn	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4
EDU 6415	Law, Policy, and the Ecosystem of Education	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6517	Foundations of Teaching English as a Second Language: Research and Practice <sup>2</sup>	4
<b>Practicum</b>		
EDU 6874	Practicum, Portfolio, and Panel Review	4

<sup>1</sup> For students who do not pass or complete their Gateway Performance Task I in EDU 6310 Literacy Development and the Academic Domains, complete EDU 6995 Project to meet programmatic and licensure requirements.

<sup>2</sup> For students who do not pass or complete their Gateway II assessment in EDU 6517 Foundations of Teaching English as a Second Language: Research and Practice, or early fieldwork, complete EDU 6995 Project to meet programmatic and licensure requirements.

<sup>3</sup> Required for nonlicensure and licensure programs of study except ESL Massachusetts Licensure Pathway. ESL Massachusetts Licensure Pathway students may substitute EDU 6410 Instructional Leadership with the completion of all ESL Massachusetts Licensure Pathway courses .

### CONCENTRATION IN LEARNING AND INSTRUCTION

Code	Title	Hours
<b>Required Courses</b>		
EDU 6319	How People Learn	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4
EDU 6410	Instructional Leadership <sup>5</sup>	4
EDU 6415	Law, Policy, and the Ecosystem of Education	4
<b>Capstone</b>		
EDU 6225 or EDU 6874	Capstone (to be taken last) <sup>1</sup> Practicum, Portfolio, and Panel Review	4
<b>Electives</b>		
Complete 16 quarter hours at the EDU 6000 level. Below is a list of elective options:		16
<b>Experiential Teaching and Learning Electives</b>		
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	
<b>Learning Experience Design Technology Electives</b>		
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6332	Open Learning	
EDU 6333	Social Media and Beyond	

**Generalist Electives**

EDU 6182	Educational Statistics
EDU 6227	The New Supervisor
EDU 6228	Supervising Through Change
EDU 6229	Challenges in Supervision
EDU 6231	Crisis Management
EDU 6329	Connecting Theory and Practice
EDU 6340	Learning Analytics Concepts and Theories
EDU 6558	Issues in Education

**ESL Massachusetts Licensure Pathway**

EDU 6300	Introduction to Language and Linguistics
EDU 6310	Literacy Development and the Academic Domains <sup>2</sup>
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction
EDU 6513 or EDU 6185	Sheltered English Immersion in the General Classroom <sup>4</sup>
EDU 6517	English-Language Learners in the General Education Classroom
	Foundations of Teaching English as a Second Language: Research and Practice <sup>3</sup>

<sup>1</sup> Complete EDU 6874 Practicum, Portfolio, and Panel Review instead of EDU 6225 Capstone if pursuing Massachusetts ESL Licensure Pathway courses.

<sup>2</sup> For students who do not pass or complete their Gateway Performance Task I in EDU 6310 Literacy Development and the Academic Domains, complete EDU 6995 Project to meet programmatic and licensure requirements.

<sup>3</sup> For students who do not pass or complete their Gateway II assessment in EDU 6517 Foundations of Teaching English as a Second Language: Research and Practice, or early fieldwork, complete EDU 6995 Project to meet programmatic and licensure requirements.

<sup>4</sup> EDU 6513: For students pursuing emergency secondary teaching licenses or ESL+ licensure in Massachusetts.

<sup>5</sup> Required for nonlicensure and licensure programs of study except ESL Massachusetts Licensure Pathway. ESL Massachusetts Licensure Pathway students may substitute EDU 6410 Instructional Leadership with the completion of all ESL Massachusetts Licensure Pathway courses .

**CONCENTRATION IN SPECIAL EDUCATION**

Code	Title	Hours
<b>Required Courses</b>		
EDU 6425	Special Education: Role of Special Educators in an Inclusive School <sup>1</sup>	4
EDU 6426	Developmental Language, Literacy, and Writing: Assessment and Instruction	4
EDU 6438	Teachers as Curriculum Leaders	4
EDU 6528	Adaptive Learning/Behavior Management Strategies: Consultation and Collaboration	4
EDU 6569	Differentiated Instruction and Assessment in Mathematics <sup>2</sup>	4
EDU 6874	Practicum, Portfolio, and Panel Review	4
<b>Electives</b>		
Complete 12 quarter hours at the EDU 6000 level.		12

<sup>1</sup> For students who do not pass their Gateway Performance Task I in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

<sup>2</sup> For students who do not pass their Gateway Performance Task II in this course, complete EDU 6995 to meet programmatic and endorsement requirements.

**Higher Education Administration, MEd**

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Master of Education in Higher Education Administration prepares practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Master of Education in Higher Education Administration degree program seeks to prepare student with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real world problems. This innovative master's degree program explores complex industry issues such as student demographics, financial concerns, legal and policy requirements, technology, and competitive forces.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### General Requirements

Code	Title	Hours
EDU 6051	Introduction to Social Justice in Educational Settings	4
EDU 6204	The Foundations of Higher Education	5

### Required Courses

Code	Title	Hours
EDU 6205	The Demographics of the New College Student	4
EDU 6217	The History of Colleges and Universities	4
EDU 6218	Money Matters: Financial Management in Higher Education	4
EDU 6219	Higher Education Law and Policy	4
EDU 6234	Program Evaluation, Assessment, and Accreditation in Higher Education	4

### Capstone

Code	Title	Hours
EDU 6222	Contemporary Issues Capstone	4

### Electives

Code	Title	Hours
Complete 12 quarter hours at the EDU 6000 level or choose from the following courses:		
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	12
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6216	The College Student Experience	
EDU 6224	Strategic Leadership in Enrollment Management	
EDU 6227	The New Supervisor	
EDU 6228	Supervising Through Change	
EDU 6229	Challenges in Supervision	
EDU 6231	Crisis Management	
EDU 6319	How People Learn	
EDU 6329	Connecting Theory and Practice	
LDR 6100	Developing Your Leadership Capability	

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

#### Analytics, MPS

With the proliferation of data across all sectors of the global economy, there is an immediate need for individuals to be knowledgeable in how to harness this data for continuous analysis and study. This spectrum spans from commercial to nonprofit, from higher education to government, and is constantly expanding with new sectors as data mining becomes the standard for knowledge gathering in the digital age.

The Master of Professional Studies in Analytics helps to meet the demand from employers with a graduate program that provides students with an end-to-end analytics education through a core curriculum with integrated experiential learning opportunities. The program is designed to prepare

students with a deep understanding of the mechanics of working with data (i.e., its collection, modeling, and structuring), along with the capacity to identify and communicate data-driven insights that ultimately influence decisions.

Not only will students graduate with a portfolio of work samples that demonstrate their range and depth of skill, they will be part of a larger network of analytics professionals who will serve them now and in the future.

- Build portfolios of real-world projects demonstrating competency with key technologies, visualization and communication techniques, and the ability to translate information into recommended actions.
- Gain a core analytical skill set upon which to layer more specialized technical skill sets or industry-specific applications.
- Develop a relationship to industry leaders and peers so that you may leverage your Northeastern education long after your formal education ends.
- Choose from a host of flexible programming options—all of which share an industry-defined core curriculum and a required, credit-bearing experiential requirement.
- Anticipate and contribute to the future direction of data analytics.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

### **Required Courses**

Code	Title	Hours
Note: ITC 6000 is for students without prior educational or professional experience with data and database structures. Students who do not complete ITC 6000 must complete a third elective course to reach 45 quarter hours.		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6050	Introduction to Enterprise Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
ITC 6000	Database Management Systems	3

### **Experiential Learning Course**

Code	Title	Hours
ALY 6080	Integrated Experiential Learning	3

### **Experiential Capstone Course**

Code	Title	Hours
ALY 6980	Capstone	3

The remaining quarter hours of the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

### **Concentrations**

- Applied Machine Intelligence (p. 855)
- Evidence-Based Management (p. 855)
- Statistical Modeling (p. 855)

### **Electives**

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	

ALY 6130	Risk Management for Analytics
ALY 6140	Python and Analytics Systems Technology
ALY 6150	Healthcare/Pharmaceutical Data and Applications
ALY 6160	Business Intelligence in Healthcare/Pharmaceutical
ALY 6983	Topics
CED 6230	Quantitative Methods
CMN 6005	Foundations of Professional Communication
COP 6940	Personal and Career Development
EAI 6000	Fundamentals of Artificial Intelligence
EAI 6010	Applications of Artificial Intelligence
EAI 6020	AI System Technologies
EAI 6400	Data Governance and Responsible AI
EDU 6184	Interdisciplinary Foundations
GIS 5201	Advanced Spatial Analysis
ITC 6020	Information Systems Design and Development
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility
ITC 6310	Information Security Governance
LDR 6110	Leading Teams Strategically in a Global Environment
LDR 6135	Ethical Leadership
PJM 6015	Project Risk Management
PJM 6125	Project Evaluation and Assessment
PJM 6180	Project Stakeholder Management

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

#### APPLIED MACHINE INTELLIGENCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3

#### EVIDENCE-BASED MANAGEMENT

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6060	Decision Support and Business Intelligence	3
ALY 6120	Leadership in Analytics	3
ALY 6130	Risk Management for Analytics	3
PJM 6005	Project Scope Management	3

#### STATISTICAL MODELING

Code	Title	Hours
ALY 6020	Predictive Analytics	3
ALY 6030	Data Warehousing and SQL	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3
ALY 6140	Python and Analytics Systems Technology	3

### Applied Logistics, MPS

The Master of Professional Studies in Applied Logistics is built to prepare students to be agile in the changing warehousing and distribution industry. As a central pillar of the program, students will study how to handle challenges that arise quickly and develop leadership and project management

skills to help communicate to customers, avoid reactionary responses, work collaboratively to find a solution, and to effectively communicate across the supply chain and with customers. By integrating systems thinking with training in the technical applications in logistics, students will gain well-rounded experience that allows them to understand and adapt to strategic imperatives while also being able to execute in detail. The program aims to develop proficiency in descriptive analytics and the use of real-time data to optimize routing among distribution centers and fulfill orders in response to changing customer profiles, shifting product sales, disruptions in the supplier network, and customer demand for packaging changes.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Courses

Code	Title	Hours
APL 6000	Foundations of Applied Logistics Execution	3
APL 6010	Warehouse Management	3
APL 6020	Freight Management	3
APL 6030	ERP Systems for Inventory Management	3

### Capstone

Code	Title	Hours
APL 6980	Applied Logistics Capstone	3

The remaining quarter hours may be completed by a combination of completing a concentration and electives or selecting any courses listed in the concentrations and elective lists.

### Concentrations

- Analytics (p. 857)
- Applied Machine Intelligence (p. 857)
- Leadership (p. 857)
- Project Management (p. 857)

### Electives

Code	Title	Hours
APL 6050	Supplier Management	
APL 6100	Advanced Technology in Logistics and Distribution	
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6060	Negotiation, Mediation, and Facilitation	
INT 6943	Integrative Experiential Learning	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
PJM 5900	Foundations of Project Management	
PJM 6185	Managing Innovation Projects	
PJM 6210	Communication Skills for Project Managers	
SMT 6060	Decision Support and Sales Analytics	

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

**Concentrations****ANALYTICS CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

**APPLIED MACHINE INTELLIGENCE CONCENTRATION**

Code	Title	Hours
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
ALY 6040	Data Mining Applications	3
ALY 6110	Data Management and Big Data	3

**LEADERSHIP CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3
<b>Elective</b>		
Complete one of the following:		3
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	

**PROJECT MANAGEMENT CONCENTRATION**

Code	Title	Hours
<b>Required Courses</b>		
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
<b>Elective</b>		
Complete 3-6 quarter hours from the following:		3-6
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	

PJM 6710	Introduction to Program and Portfolio Management
PJM 6983	Topics

- <sup>1</sup> Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute any project management electives to satisfy the required program hours.

## Applied Machine Intelligence, MPS

Humankind is on the threshold of a new era—an age of artificial intelligence (AI) as revolutionary in its global impact as the Industrial Revolution. With the proliferation of machine learning and AI across all sectors of the global society, and fields such as financial services, healthcare, and robotics, GEOINT and cybersecurity are already changing as intelligent computers take on once-indispensably human tasks. There is an immediate need for individuals to be knowledgeable in how to manage, analyze, communicate, visualize, and lead in the area of AI by being data, technology, and human literate. The experiential AI curricula includes an introductory core, as well as an advanced core with an end-to-end AI education in the areas of finance, HR, business ventures, and healthcare/pharmaceuticals. The goal is to proactively and thoughtfully prepare students for the evolving technology and the challenges it presents. The curricula framework adopts a multidisciplinary approach to problem solving by combining computer science and analytical skills with functional government and industry expertise, creativity, and leadership with program offerings on-ground and online.

The degree program is distinguished from others by:

- Focusing on the specific but widespread field of AI that exists within a variety of industries and applications
- Northeastern faculty experts, who have extensive and proven experience in computer science, analytics, geospatial science, information technology, etc.
- Courses that focus on providing critical skills in data management, data analysis, data visualization, problem solving, and advanced analytical tools, creating AI-driven decision making in fields like healthcare/pharmaceuticals, finance, HR, and business ventures

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
ALY 6110	Data Management and Big Data	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6010	Applications of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
EAI 6400	Data Governance and Responsible AI	3

### Experiential Network and Capstone

Code	Title	Hours
EAI 6980	Integrated Experiential Capstone	3
Choose one of the following:		
ALY 6080	Integrated Experiential Learning	
INT 6940	Experiential Learning Projects for Professionals	

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

### Concentrations

- AI for Business Ventures (p. 859)
- AI for Finance (p. 859)

- AI for Healthcare (p. 859)
- AI for Human Resources (p. 859)

## Electives

Code	Title	Hours
ALY 6140	Python and Analytics Systems Technology	
CMN 6000	Introduction to Organizational Communication	
CED 6050	Commerce and Economic Development	
EAI 6080	Advanced Analytical Utilization	
EDU 6184	Interdisciplinary Foundations	
GIS 5201	Advanced Spatial Analysis	
GIS 6360	Spatial Databases	
LDR 6135	Ethical Leadership	
PJM 6005	Project Scope Management	
PJM 6015	Project Risk Management	
PJM 6205	Leading and Managing Technical Projects	

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

## Concentrations

### AI FOR BUSINESS VENTURES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
CED 6230	Quantitative Methods	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
ITC 6015	Enterprise Information Architecture	3

### AI FOR FINANCE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
EAI 6050	Finance Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
FIN 6101	Accounting Fundamentals for Financial Institutions	3

### AI FOR HEALTHCARE

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6150	Healthcare/Pharmaceutical Data and Applications	3
EAI 6060	Healthcare Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3

### AI FOR HUMAN RESOURCES

Code	Title	Hours
ALY 6040	Data Mining Applications	3
ALY 6120	Leadership in Analytics	3
EAI 6070	Human Resources Information Processing	3
EAI 6120	AI Communication and Visualization	3
HRM 6025	Workforce Analytics	3

## Digital Media, MPS

Students in the Master of Professional Studies in Digital Media will build their skills and expertise while gaining experience using a variety of industry-standard and cutting-edge technologies and tools. Our curriculum is organized around three types of experiences: core courses, concentration electives, and a capstone that can be completed as an individual thesis or a team project.

Our core courses in media creation, interactive design, usability, design thinking, and narrative structure provide a baseline for producing content-rich experiences. A series of electives are offered in seven distinctive areas: 3D animation, game design, digital video, social media, digital media management, or one of two tracks in interactive design: visual design or usability and production. In the capstone experience, you'll work with the guidance of faculty to channel your passion into a project that provides tangible evidence of your abilities.

Whether you are a full- or part-time student, our cohort structure allows you to build meaningful working relationships with students from around the globe. Team-based assignments strengthen your project management and leadership skills and allow you to take part in the design and development of more complex media projects than you could by working alone. The team efforts will also prepare you for your future as a professional in digital media's collaboration-oriented culture.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

#### Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
Thesis Option		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis (at 6 QH)	
Capstone Option		
DGM 7980	Capstone	

Choose one technical course from the workshops list below.

#### Concentrations

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives/workshops or selecting any courses in the concentrations and elective lists. You must complete any prerequisites associated with DGM courses unless granted a waiver under special circumstances.

- 3D Animation (p. 861)
- Digital Media Management (p. )
- Digital Video (p. )
- Game Design (p. )
- Interactive Design (p. )
- Social Media (p. )

**Electives**

Code	Title	Hours
Complete one of the following:		3-4
ALY 6110	Data Management and Big Data	
DGM 6125	Time-Based Media	
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
EDU 6184	Interdisciplinary Foundations	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

**Workshops**

Optional digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
Students may complete one of the following:		
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892	Capstone Project Preparation	
TCC 6410	Online Documentation	
TCC 6630	Introduction to XML	

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**3D ANIMATION**

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4
DGM 6535	Rigging Principles and Techniques	4
DGM 6540	Compositing	4

**DIGITAL MEDIA MANAGEMENT**

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4

**DIGITAL VIDEO**

Code	Title	Hours
DGM 6520	Lighting for the Camera	4
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6540	Compositing	4
DGM 6545	Documentary and Nonfiction Production	4

**GAME DESIGN**

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4

DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

**INTERACTIVE DESIGN**

Code	Title	Hours
Interactive Design		
DGM 6461	Interactive Information Design 1	4
Complete four courses from one of the following tracks:		
Design Track		
DGM 6217	Typography for Interactivity	4
DGM 6317	Screen-Based Publication Design	4
DGM 6463	Interactive Information Design 2	4
DGM 6471	Designing Infographics	4
Usability and Development Track		
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6451	Web Development	4
DGM 6525	Research Methods for Global User Experiences	4
TCC 6110	Information Architecture	4
TCC 6710	Content Strategy	4

**SOCIAL MEDIA**

Code	Title	Hours
Complete the following:		
Required		
DGM 6285	Interactive Marketing Fundamentals	4
Electives		
Complete 15–17 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	4
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	4
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	4
CMN 6075	Digital Marketing Analytics	4
DGM 6290	Social Media and Brand Strategy Implementation	4
DGM 6525	Research Methods for Global User Experiences	4
DGM 6550	Search Engine Optimization: Strategy and Implementation	4

**Digital Media, MPS—Connect**

The Master of Professional Studies in Digital Media Connect program is designed for students without prior experience in core technical and/or creative concepts. This program requires an additional 12 quarter hours of credit, with courses providing intensive, hands-on guidance into the essential knowledge required for the Master of Professional Studies Digital Media curriculum.

For students considering a career change into digital media, this coursework helps you connect your current background to a new digital media track. Courses focus on visual communications, programming foundations, and web creation. Once the fundamental courses are completed, students move into the more advanced Master of Professional Studies in Digital Media course requirements.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Foundation Courses

Code	Title	Hours
DGM 6105	Visual Communications Foundation	4
DGM 6108	Programming Foundations for Digital Media	4
DGM 6109	Lab for DGM 6108	2
DGM 6501	Web Creation Boot Camp	2

## Required Core Courses

Code	Title	Hours
DGM 6122	Foundations of Digital Storytelling	4
DGM 6145	Information Technology and Creative Practice	4
DGM 6521	Web Creation for Content Management Systems	2
Complete one of the following:		4
DGM 6140	Sound Design	
DGM 6168	Usability and Human Interaction	
Complete one of the following options:		8
<b>Thesis Option</b>		
DGM 6890	Thesis Proposal Development	
DGM 7990	Thesis (at 6 QH)	
<b>Capstone Option</b>		
DGM 7980	Capstone	

Complete one technical course from the workshops list below.

## Concentrations

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives/workshops or selecting any courses in the concentrations and elective lists. You must complete any prerequisites associated with DGM courses unless granted a waiver under special circumstances.

- 3D Animation (p. 864)
- Digital Media Management (p. )
- Digital Video (p. )
- Game Design (p. )
- Interactive Design (p. )
- Social Media (p. )

## Elective

Code	Title	Hours
Complete one of the following:		3-4
ALY 6110	Data Management and Big Data	
DGM 6125	Time-Based Media	
DGM 6322	Advanced Digital Storytelling	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
EDU 6184	Interdisciplinary Foundations	
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	

## Workshops

Digital media workshops are designed to provide valuable technical skills and tools for students in all graduate degree programs.

Code	Title	Hours
DGM 6506	Introduction to Digital Video	
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
DGM 6892	Capstone Project Preparation	

TCC 6410	Online Documentation
TCC 6630	Introduction to XML

## Program Credit/GPA Requirements

56 total quarter hours required

Minimum 3.000 GPA required

### 3D ANIMATION

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4
DGM 6535	Rigging Principles and Techniques	4
DGM 6540	Compositing	4

### DIGITAL MEDIA MANAGEMENT

Code	Title	Hours
DGM 6230	Digital Media Entrepreneurship	4
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4

### DIGITAL VIDEO

Code	Title	Hours
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6520	Lighting for the Camera	4
DGM 6540	Compositing	4
DGM 6545	Documentary and Nonfiction Production	4

### GAME DESIGN

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

### INTERACTIVE DESIGN

Code	Title	Hours
<b>Interactive Design</b>		
DGM 6461	Interactive Information Design 1	4
Complete four courses from one of the following tracks:		
<b>Design Track</b>		
DGM 6217	Typography for Interactivity	
DGM 6317	Screen-Based Publication Design	
DGM 6463	Interactive Information Design 2	
DGM 6471	Designing Infographics	
<b>Usability and Development Track</b>		
DGM 6268	Usable Design for Mobile Digital Media	
DGM 6308	Intermediate Programming for Digital Media	
DGM 6451	Web Development	
DGM 6525	Research Methods for Global User Experiences	

TCC 6110	Information Architecture	
TCC 6710	Content Strategy	
<b>SOCIAL MEDIA</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Required</b>		
DGM 6285	Interactive Marketing Fundamentals	4
<b>Electives</b>		
Complete 15–17 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6525	Research Methods for Global User Experiences	
DGM 6550	Search Engine Optimization: Strategy and Implementation	

## Informatics, MPS

A rapidly evolving area, informatics is increasingly used to solve today's problems through IT innovations across many industries, including healthcare, business consulting, education, finance, and social media. This master's degree attracts students and working professionals with a diverse background to learn and improve IT technical and management skills, highlighted by our strengthened curriculum on information security management, as well as cloud computing application and management. Students also have the opportunity to acquire technical training in data analytics, user-centered design and web development, and managing technical projects.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
ITC 6000	Database Management Systems	3
ITC 6010	Information Technology Strategy and Governance	3
ITC 6020	Information Systems Design and Development	3
ITC 6035	Information Technology Project Management	3
ITC 6400	Foundations of Informatics	3
<b>Capstone and Experiential Learning</b>		
ITC 6040	Informatics Capstone	3
INT 6940	Experiential Learning Projects for Professionals	1-4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentrations and electives lists.

## Concentrations or Electives

Complete one of the following concentrations or complete the required hours by selecting any courses listed in the concentrations and electives lists:

- Analytics (p. 866)
- Cloud Computing Application and Management (p. 866)
- Human-Centered Informatics (p. 866)

- Information Security Management (p. 866)
- Leading and Managing Technical Projects (p. 866)

**ANALYTICS CONCENTRATION**

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		3
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

**CLOUD COMPUTING APPLICATION AND MANAGEMENT CONCENTRATION**

Code	Title	Hours
ITC 6015	Enterprise Information Architecture	3
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6460	Cloud Analytics	3
ITC 6520	Network Protection and Cloud Security	3
Complete one of the following:		3-4
ITC 6355	Web Application Design and Development	
ITC 6470	Enterprise Data Storage and Management Technologies	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

**HUMAN-CENTERED INFORMATICS CONCENTRATION**

Code	Title	Hours
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6461	Interactive Information Design 1	4
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
Complete one of the following:		3-4
ALY 6070	Communication and Visualization for Data Analytics	
DGM 6463	Interactive Information Design 2	
ITC 6355	Web Application Design and Development	

**INFORMATION SECURITY MANAGEMENT CONCENTRATION**

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3
ITC 6530	Security Analytics	3
Complete one of the following:		3
ITC 6330	CISSP Preparation	
ITC 6490	Ethical Hacking	

**LEADING AND MANAGING TECHNICAL PROJECTS CONCENTRATION**

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3

PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

- 1 Note: Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete Foundations of Project Management (PJM 5900) may substitute an elective from the following list to satisfy the required program hours:
- Project Evaluation and Assessment (PJM 6125)
  - Project Quality Management (PJM 6135)
  - Managing Troubled Projects (PJM 6140)
  - Introduction to Program and Portfolio Management (PJM 6710)

## ELECTIVES

Code	Title	Hours
ALY 6015	Intermediate Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	
ALY 6120	Leadership in Analytics	
ALY 6130	Risk Management for Analytics	
DGM 6501	Web Creation Boot Camp	
DGM 6145	Information Technology and Creative Practice	
DGM 6521	Web Creation for Content Management Systems	
EDU 6184	Interdisciplinary Foundations	
GIS 5103	Foundations of Geographic Information Science	
GIS 6340	GIS Customization	
GIS 6360	Spatial Databases	
ITC 6030	Computer Systems and Networks	
ITC 6080	Network Security Concepts	
ITC 6082	Network Protection	
ITC 6345	Systems and Network Administration	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
PJM 5900	Foundations of Project Management	
PJM 6205	Leading and Managing Technical Projects	
TCC 6110	Information Architecture	

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

## Insurance Analytics and Management, MPS

### Overview

The Master of Professional Studies in Insurance Analytics and Management addresses the mounting need for talent in the insurance industry with focus on disruptive trends and the inherent challenges that this industry sector faces. This program will build on five distinct pillars that are designed to serve the market and to offer graduates a clear pathway into the industry. Those pillars are application orientation, domain knowledge, digital leadership and human-centered design, decision support, and digital transformation. The goal of the MPS program is to produce graduates who are thinkers and designers and developers who merge applications, humanics, data, and technology in the age of digital transformation to benefit their industry.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### **Core Courses**

Code	Title	Hours
INS 6010	Insurance Finance	3
INS 6020	Claims Management	3
INS 6030	Insurance Underwriting	3
INS 6040	Introduction to Insurance Data Analytics	3
INS 6050	Intermediate Insurance Analytics	3

### **Experiential Project**

Code	Title	Hours
INS 6080	Integrated Experiential Learning	3

### **Capstone**

Code	Title	Hours
INS 6980	Capstone	3

### **Concentrations**

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list.

- Advanced Insurance Management (p. 869)
- Customer Engagement (p. 869)
- Decision Support (p. 869)

### **Electives**

Code	Title	Hours
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	
CED 6230	Quantitative Methods	
CED 6250	Derivatives and Alternative Investments	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6020	AI System Technologies	
EAI 6080	Advanced Analytical Utilization	
EAI 6120	AI Communication and Visualization	
GIS 5103	Foundations of Geographic Information Science	
GIS 6370	Internet-Based GIS	
INS 6983	Special Topics	
LDR 6110	Leading Teams Strategically in a Global Environment	
PJM 5900	Foundations of Project Management	
PJM 6210	Communication Skills for Project Managers	

### **Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**ADVANCED INSURANCE MANAGEMENT CONCENTRATION**

Code	Title	Hours
ALY 6983	Topics	3
INS 6110	Insurance Regulation and Law	3
INS 6120	Macro Challenges in Insurance	3
INS 6130	Advanced Reinsurance	3
LDR 6135	Ethical Leadership	3

**CUSTOMER ENGAGEMENT CONCENTRATION**

Code	Title	Hours
ALY 6060	Decision Support and Business Intelligence	3
ALY 6070	Communication and Visualization for Data Analytics	3
INS 6140	Distribution and Sales	3
PJM 6185	Managing Innovation Projects	3
SMT 6020	Managing the Customer Experience	3

**DECISION SUPPORT CONCENTRATION**

Code	Title	Hours
EAI 6000 is for students who score 85% or more on the Python placement exam upon declaring this concentration. Students who score less than 85% on the placement exam complete a noncredit Python workshop before completing EAI 6000.		
ALY 6060	Decision Support and Business Intelligence	3
ALY 6070	Communication and Visualization for Data Analytics	3
EAI 6000	Fundamentals of Artificial Intelligence	3
EAI 6020	AI System Technologies	3
LDR 6100	Developing Your Leadership Capability	3

**Learning Experience Design and Technology, MPS**

The Master of Professional Studies in Learning Experience Design and Technology is a robust practice-based program. It builds expertise in learning designers, educators, trainers, technologists, and other professionals by grounding them in the art and science of learning and the effective use of learning design principles and technology. It provides both foundational and advanced design-related coursework that is experiential, taught by experts in the field, and incorporates skill-building opportunities that align with contemporary industry-based competencies.

During their course of study, students will have the opportunity to:

- Design learning environments that support learners in meeting academic, personal, professional, and/or organizational goals
- Put creative ideas into action using a variety of technologies and design and delivery modalities
- Develop a robust online portfolio of work to demonstrate their design skills

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Foundation Courses**

Code	Title	Hours
EDU 6050	Education as an Advanced Field of Study	5
EDU 6051	Introduction to Social Justice in Educational Settings	4

**Core Courses**

Code	Title	Hours
EDU 6319	How People Learn	4
EDU 6323	Digital Learning Tools and Technologies for LXD	4
EDU 6334	Foundations of Learning Experience Design	4
EDU 6335	Advanced Practices in Learning Experience Design	4
EDU 6336	Data Literacy for Data-Driven Decision Making	4

**Capstone**

Code	Title	Hours
EDU 6225	Capstone	4

**Electives**

Code	Title	Hours
EDU 5978	Independent Study	12
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6323	Digital Learning Tools and Technologies for LXD	
EDU 6329	Connecting Theory and Practice	
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6332	Open Learning	
EDU 6336	Data Literacy for Data-Driven Decision Making	
EDU 6338	Learning Experience Design Studio	
EDU 6558	Issues in Education	
CMN 6080	Intercultural Communication	
DGM 6501	Web Creation Boot Camp	
NPM 6140	Grant and Report Writing	
PJM 5900	Foundations of Project Management	

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**Commerce and Economic Development, MS**

Globalization has created a borderless economy with a host of new opportunities and challenges for those engaged in commerce and economic development. While global markets offer exciting growth prospects, navigating the world stage requires in-depth knowledge of the financial, regulatory, and economic environments and institutions that affect the global economy and international trade. To meet the need for both insight and skills development, Northeastern University's College of Professional Studies—in collaboration with Northeastern University's College of Social Sciences and Humanities—offers the online Master of Science in Commerce and Economic Development.

This graduate-level program integrates economics, leadership, institutional organization, technology, and public policy into a unique and focused educational experience designed to help guide and advance a rewarding career in the private or public sectors.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
CED 6010	Applied Microeconomic Theory 1	3
CED 6020	Applied Macroeconomic Theory 1	3
CED 6030	Mathematical Methods for Economics 1	3
CED 6040	Applied Econometrics 1	3
CED 6050	Commerce and Economic Development	3

## Capstone

Code	Title	Hours
The following course should be taken last:		
CED 6910	Capstone: Master's Project	4

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentration and elective lists.

## Concentrations

- Economic Analysis (p. 871)
- Economic Entrepreneurship (p. 871)
- Data Analytics (p. 871)
- Financial Economics (p. 871)

## Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the program:		
ALY 6000	Introduction to Analytics	
ALY 6015	Intermediate Analytics	
ALY 6050	Introduction to Enterprise Analytics	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CED 6011	Applied Microeconomic Theory 2	
CED 6021	Applied Macroeconomic Theory 2	
CED 6031	Mathematical Methods for Economics 2	
CED 6041	Applied Econometrics II	
CED 6051	Open Economy Macroeconomic Analysis	
CED 6070	Economics of Human Capital	
CED 6090	Cultural Economic Development	
CED 6110	Law and Economics	
CED 6120	Environmental Economics	
CED 6130	Sustainable Economic Development	
CED 6140	Economics of E-Commerce	
CED 6210	Managerial Finance	
CED 6220	International Finance	
CED 6230	Quantitative Methods	
CED 6240	Financial Ethics	
CED 6250	Derivatives and Alternative Investments	
CMN 6080	Intercultural Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
COP 6940	Personal and Career Development	
EDU 6184	Interdisciplinary Foundations	
FIN 6102	Asset and Liability Management	
FIN 6120	Building Financial Relationships	

FIN 6161	Investment Analysis
GST 6102	Global Corporate Social Responsibility
GST 6430	Leadership and Management
LDR 6145	Developing Sustainable Global Leadership

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**ECONOMIC ANALYSIS CONCENTRATION**

Code	Title	Hours
CED 6011	Applied Microeconomic Theory 2	3
CED 6021	Applied Macroeconomic Theory 2	3
CED 6031	Mathematical Methods for Economics 2	3
CED 6041	Applied Econometrics II	3
CED 6051	Open Economy Macroeconomic Analysis	3

**ECONOMIC ENTREPRENEURSHIP CONCENTRATION**

Code	Title	Hours
ALY 6050	Introduction to Enterprise Analytics	3
CED 6070	Economics of Human Capital	3
CED 6140	Economics of E-Commerce	3
CMN 6095	Foundations of Developing Cultural Awareness	3
GST 6430	Leadership and Management	4

**DATA ANALYTICS CONCENTRATION**

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6015	Intermediate Analytics	3
ALY 6020	Predictive Analytics	3
ALY 6050 or ALY 6070	Introduction to Enterprise Analytics Communication and Visualization for Data Analytics	3
ALY 6110	Data Management and Big Data	3

**FINANCIAL ECONOMICS CONCENTRATION**

Code	Title	Hours
Complete five of the following:		15-18
CED 6210	Managerial Finance	
CED 6220	International Finance	
CED 6230	Quantitative Methods	
CED 6240	Financial Ethics	
CED 6250	Derivatives and Alternative Investments	
FIN 6102	Asset and Liability Management	
FIN 6120	Building Financial Relationships	
FIN 6161	Investment Analysis	

**Corporate and Organizational Communication, MS**

Across all industries and professions, strong written and oral communication skills are essential to success. Whether you are seeking to advance in a communications-related field or get ahead in your current organization, this program seeks to provide the practical knowledge and valuable perspectives you need to communicate across a variety of contexts and situations.

From negotiation and writing to crisis management and public speaking, the Master of Science in Corporate and Organizational Communication degree program examines topics that are critical to effective organizational communication. Incorporating best practices, case studies, and classroom learning, courses within this innovative master's degree in communication address complex communication challenges, seeking to provide you with a distinct advantage in today's competitive marketplace.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab <sup>1</sup>	4
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
Complete two of the following:		6
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6100	Communication Networks and Managing Information	

<sup>1</sup> Introduction to Organizational Communication (CMN 6000) is required for students who do not have any professional experience in communication. Students with professional communication experience begin the program with Strategic Communication Management (CMN 6010) and complete an additional elective to satisfy the required program hours.

### Capstone

Code	Title	Hours
CMN 6940	Projects for Professionals	4

### Concentration or Electives

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses in the concentrations and elective lists.

#### CONCENTRATIONS

- Cross-Cultural Communication (p. 874)
- Human Resource Management (p. 874)
- Leadership (p. 875)
- Project Management (p. 875)
- Public and Media Relations (p. 875)
- Sales Management (p. 876)
- Social Media (p. 876)

#### ELECTIVE COURSES

Note: Students who take Introduction to Organizational Communication (CMN 6000) are only required to take two courses in this section.

Code	Title	Hours
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6005	Foundations of Professional Communication	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	

CMN 6095	Foundations of Developing Cultural Awareness
CMN 6096	Cultural Communications Lab
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management
COP 6940	Personal and Career Development
EDU 6184	Interdisciplinary Foundations
INT 6900	International Field Study Experience
LDR 6101	Leadership Challenge Lab
PBR 6001	Communications Technology Lab

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### CROSS-CULTURAL COMMUNICATION

Code	Title	Hours
<b>Required Courses</b>		
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3
<b>Concentration Electives</b>		
Choose from the following:		10
CMN 6096	Cultural Communications Lab	
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
HRM 6070	Global Human Resources Management	
INT 6900	International Field Study Experience	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6145	Developing Sustainable Global Leadership	
PBR 6100	Introduction to Public Relations	

### HUMAN RESOURCE MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
HRM 6015	Introduction to Human Resources Management <sup>2</sup>	3
HRM 6025	Workforce Analytics	3
HRM 6042	Strategic Workforce Planning	3
<b>Concentration Electives</b>		
Choose from the following:		7
CMN 6096	Cultural Communications Lab	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	
HRM 6047	Managing the Employee Life Cycle	
HRM 6050	Employee Engagement	
HRM 6060	Organizational Design	
HRM 6070	Global Human Resources Management	

<sup>2</sup> Introduction to Human Resources Management (HRM 6015) is required for students who do not have at least two years of professional experience in human resources. Students with two years or more of professional project experience may substitute electives to satisfy the required program hours.

**LEADERSHIP**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
<b>Concentration Electives</b>		
Choose from the following:		6
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050	Employee Engagement	
LDR 6115	Developing Strategic and Authentic Leadership Communication	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	

**PROJECT MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
PJM 5900	Foundations of Project Management <sup>3</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
<b>Concentration Electives</b>		
Choose from the following:		5
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6810	Principles of Agile Project Management	

<sup>3</sup> Students with project management experience are not required to take Foundations of Project Management (PJM 5900) and may substitute electives to satisfy the required program hours.

**PUBLIC AND MEDIA RELATIONS**

Code	Title	Hours
<b>Required Courses</b>		
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Public Relations Research: Understanding External Audiences	3
<b>Concentration Electives</b>		
Choose from the following:		7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	
PBR 6125	Community Relations and Corporate Social Responsibility	
PBR 6130	Public Relations Content Development	
PBR 6140	Advanced Public Relations Content Development	

**SALES MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
SMT 6010	Building Business Acumen	3
SMT 6020	Managing the Customer Experience	3
SMT 6060	Decision Support and Sales Analytics	3
<b>Concentration Electives</b>		
Complete a minimum of 6 quarter hours from the following:		6
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6060	Negotiation, Mediation, and Facilitation	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 5900	Foundations of Project Management	
PJM 6185	Managing Innovation Projects	
PJM 6210	Communication Skills for Project Managers	
SMT 6983	Topics	

**SOCIAL MEDIA**

Code	Title	Hours
<b>Required Courses</b>		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6285	Interactive Marketing Fundamentals	4
DGM 6290	Social Media and Brand Strategy Implementation	4
<b>Concentration Electives</b>		
Choose from the following:		5
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	

**Global Studies and International Relations, MS**

Globalization has created a world of new opportunities for those savvy enough to recognize them and acquire the new skill sets needed for success in international government, consulting, business and industry, nonprofit, and educational sectors.

This program is designed to prepare students for internationally focused positions that range from traditional practitioners of diplomacy; to development workers; to executives employed in the dynamic world of international consultancy, trade, and industry. With courses enriched by classmates from every continent, students are active learners in a collaborative, cross-cultural setting from their very first course.

The core curriculum ensures all students have a solid grounding in foundational courses such as international politics, economics, security, and diplomacy. Students then select from a broad-based menu of concentrations, allowing them to develop specialties. The program culminates in a capstone experience in which students elect to write a thesis, engage in a case study, or undertake short-term travel to conduct intensive field research.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6109	Basic Field Research Methods	4
GST 6320	Peace and Conflict	4

## Regional Studies Courses

Code	Title	Hours
Complete one of the following:		4
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

## Capstone

Code	Title	Hours
Complete one of the following:		4
GST 6920	Case Study in Global Studies	
GST 7990	Thesis	
INT 6900	International Field Study Experience	

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list. Note: A minimum of 18–20 quarter hours must be completed within global studies electives.

## Concentrations

- Global Health and Development (p. )
- Conflict Resolution (p. )
- Diplomacy (p. 879)
- International Economics and Consulting (p. )

## Electives

Code	Title	Hours
Choose from the following:		
<b>Global Studies Electives</b>		
GST 6102	Global Corporate Social Responsibility	
GST 6105	Foundations of Global Studies and International Relations	
GST 6200	The Funders	
GST 6210	The Developers	
GST 6220	Globalization of Emerging Economies	
GST 6300	Security and Terrorism	
GST 6310	Immigration and Labor	
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6360	Nuclear Nonproliferation	
GST 6425	Comparative Higher Education Systems Across Regions	
GST 6430	Leadership and Management	
GST 6525	International Organizations: Law and Diplomacy	

GST 6550	U.S. Foreign Policy
GST 6540	Politics of the European Union
GST 6560	Multilateral Diplomacy
GST 6580	Opportunities in International Consulting
GST 6590	Public Diplomacy
GST 6600	The Practice of Diplomacy
GST 6610	Sustainable Development
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development
GST 6710	Critical Issues and Challenges in the Practice of Global Health
GST 6740	Human Rights
GST 6810	International Higher Education
GST 6820	Managing Study Abroad
GST 6830	Managing International Students
GST 6840	The Business of International Education
GST 6850	Immigration and Legal Issues in International Higher Education
GST 6965	Professional Practice in Global Education
GST 7983	Topics
<b>Other Electives</b>	
ALY 6000	Introduction to Analytics
ALY 6010	Probability Theory and Introductory Statistics
CED 6120	Environmental Economics
CED 6130	Sustainable Economic Development
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation
COP 6940	Personal and Career Development
EDU 6184	Interdisciplinary Foundations
LDR 6145	Developing Sustainable Global Leadership
NPM 6140	Grant and Report Writing
PJM 5900	Foundations of Project Management

### Program Credit/GPA Requirements

46 total quarter hours required

Minimum 3.000 GPA required

### GLOBAL HEALTH AND DEVELOPMENT

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		
GST 6210	The Developers	
GST 6340	The Economics of Development	
GST 6350	Global Economics of Food and Agriculture	
GST 6610	Sustainable Development	
GST 6700	Global Health Perspectives, Politics, and Experiences in International Development	
GST 6710	Critical Issues and Challenges in the Practice of Global Health	

### CONFLICT RESOLUTION

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		
GST 6324	Divided Societies in the Modern World	
GST 6326	International Conflict and Cooperation	
GST 6327	Conflict and Postconflict Development	

GST 6300	Security and Terrorism
GST 6360	Nuclear Nonproliferation
GST 6740	Human Rights

**DIPLOMACY**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		
GST 6600	The Practice of Diplomacy	
GST 6540	Politics of the European Union	
GST 6550	U.S. Foreign Policy	
GST 6560	Multilateral Diplomacy	
GST 6590	Public Diplomacy	
GST 6740	Human Rights	

**INTERNATIONAL ECONOMICS AND CONSULTING**

Code	Title	Hours
Complete five of the following (one of the courses can be from another global studies concentration, a regional studies course, or a special topics course if you choose):		
GST 6102	Global Corporate Social Responsibility	
GST 6200	The Funders	
GST 6220	Globalization of Emerging Economies	
GST 6310	Immigration and Labor	
GST 6340	The Economics of Development	
GST 6430	Leadership and Management	
GST 6580	Opportunities in International Consulting	

**Human Resources Management, MS**

The human resources management program in the College of Professional Studies is designed to prepare students to make the connection between an organization's strategy and its people and other key stakeholders. The program focuses on vital human resource competencies and analytical skills—with an emphasis on experiential learning—required for students to serve as strategic business partners in their organizations. Students also have the opportunity to tailor their studies to support their specific career objectives.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
Based on your experience, complete one of the two options below:		
Two or more years of human resources experience:		
HRM 6025	Workforce Analytics	6
HRM 6042	Strategic Workforce Planning	
Fewer than two years of experience:		
HRM 6015	Introduction to Human Resources Management	9
HRM 6025	Workforce Analytics	
HRM 6042	Strategic Workforce Planning	

**Core Electives**

Complete four of the following:	12
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HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices
HRM 6010	Compensation and Benefits
HRM 6020	Talent Acquisition and Onboarding
HRM 6030	The Employment Contract
HRM 6035	Digital Human Resources Platforms
HRM 6047	Managing the Employee Life Cycle
HRM 6050	Employee Engagement
HRM 6060	Organizational Design
HRM 6070	Global Human Resources Management

**Capstone**

Code	Title	Hours
HRM 6940	Projects for Professionals	4

**Concentration or Electives**

In addition to the core requirements, students may complete either a combination of a concentration and additional electives or selecting any courses in the concentrations and elective lists.

**CONCENTRATIONS**

- Artificial Intelligence for Human Resources (p. 880)
- Digital Human Resources (p. 881)
- Global Talent Management (p. 881)
- Leadership (p. 881)
- Organizational Communication (p. )
- Project Management (p. 882)

**ELECTIVES**

Code	Title	Hours
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6096	Cultural Communications Lab	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
COP 6940	Personal and Career Development	
LDR 6101	Leadership Challenge Lab	

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**ARTIFICIAL INTELLIGENCE FOR HUMAN RESOURCES**

Code	Title	Hours
<b>Required Courses</b>		
EAI 6070	Human Resources Information Processing	3
EAI 6080	Advanced Analytical Utilization	3
EAI 6120	AI Communication and Visualization	3
<b>Electives</b>		
Complete two of the following:		6
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6040	Data Mining Applications	
ALY 6060	Decision Support and Business Intelligence	
ALY 6110	Data Management and Big Data	

**DIGITAL HUMAN RESOURCES**

Code	Title	Hours
<b>Required Course</b>		
HRM 6035	Digital Human Resources Platforms	3
<b>Electives</b>		
Choose from the following:		13
ALY 6000	Introduction to Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6060	Decision Support and Business Intelligence	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6096	Cultural Communications Lab	
PBR 6001	Communications Technology Lab	

**GLOBAL TALENT MANAGEMENT**

Code	Title	Hours
<b>Required Course</b>		
HRM 6070	Global Human Resources Management	3
<b>Electives</b>		
Choose from the following:		12
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6096	Cultural Communications Lab	
GST 6101	Global Literacy, Culture, and Community	
HRM 6072	Global and Comparative Employment/Employee Relations	
HRM 6074	Global Talent Acquisition and Mobility	
LDR 6145	Developing Sustainable Global Leadership	
PJM 6145	Global Project Management	

**LEADERSHIP**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
<b>Electives</b>		
Complete two of the following:		6
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050	Employee Engagement	
LDR 6115	Developing Strategic and Authentic Leadership Communication	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	

**ORGANIZATIONAL COMMUNICATION**

Code	Title	Hours
<b>Required Courses</b>		
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3
<b>Electives</b>		
Choose from the following:		7

CMN 6080	Intercultural Communication
CMN 6090	Organizational Culture, Climate, and Communication
CMN 6096	Cultural Communications Lab
CMN 6100	Communication Networks and Managing Information
PBR 6001	Communications Technology Lab

**PROJECT MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
<b>Electives</b>		
Choose from the following:		3
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

<sup>1</sup> Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

**Nonprofit Management, MS**

Facing the threat of privatization and for-profit competition, nonprofit organizations are challenged to find leaders who not only possess keen business and managerial skills but can also effect change at a community or social level. Being successful in this dynamic and rewarding field requires strong leadership, managerial and interpersonal skills, as well as in-depth knowledge of fundraising, marketing, program development, and governance issues.

Integrating theoretical approaches with practical applications, the Master of Science in Nonprofit Management seeks to prepare you for a leadership position in a not-for-profit university, hospital, charity, foundation, or religious organization. Upon completion of this nonprofit degree, you emerge well equipped to embark on a career in nonprofit management—prepared, and inspired, to make a meaningful impact.

The mission of the Master of Science in Nonprofit Management at the College of Professional Studies is to offer courses that further develop the students' knowledge, skills, talent, and abilities. Faculty in the program support students' development goals through action-oriented courses that link theoretical learning to practical application. Nonprofit management courses aim to prepare students to be mission-driven executive leaders, managers, employees, and board members in public and private nonprofit organizations.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
NPM 6100	Strategic Management for the Nonprofit Sector	3
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3
NPM 6980	Capstone	3

## Concentration or Electives Option

The remaining required quarter hours for the program may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the electives list (p. 883).

- Fundraising (p. 884)
- Leadership and Communication (p. 884)
- Project Management
- Sales Management
- Social Innovation
- Social Media Analytics (p. 886)

## Electives

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the program.		
<b>Nonprofit Management Electives</b>		
NPM 6210	Social Value Investing and Effective Partnerships	
NPM 6220	Donor Research and Management	
NPM 6230	Measuring Social Impact	
NPM 6240	Managing the Annual Fund	
NPM 6310	Social and Sustainable Entrepreneurship	
NPM 6320	New Ventures in Social Entrepreneurship	
<b>Other Electives</b>		
ALY 6000	Introduction to Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
ALY 6110	Data Management and Big Data	
CMN 6000	Introduction to Organizational Communication	
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6100	Communication Networks and Managing Information	
COP 6940	Personal and Career Development	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
EDU 6184	Interdisciplinary Foundations	
GST 6610	Sustainable Development	
INT 6000	Writing Lab	
INT 6943	Integrative Experiential Learning	

LDR 6110	Leading Teams Strategically in a Global Environment
LDR 6120	Developing Organizational Success through Leadership Development
LDR 6135	Ethical Leadership
LDR 6140	Leadership Strategy, Design, and Practice
LDR 6150	Innovation and Organizational Transformation
PJM 5900	Foundations of Project Management
PJM 6005	Project Scope Management
PJM 6015	Project Risk Management
PJM 6025	Project Scheduling and Cost Planning
PJM 6135	Project Quality Management

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

### Concentrations

#### FUNDRAISING

Code	Title	Hours
<b>Required Courses</b>		
NPM 6210	Social Value Investing and Effective Partnerships	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3
<b>Electives</b>		
Complete a minimum of 6 quarter hours from the following:		
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
NPM 6240	Managing the Annual Fund	

#### LEADERSHIP AND COMMUNICATION

Code	Title	Hours
<b>Required Courses</b>		
CMN 6090	Organizational Culture, Climate, and Communication	3
LDR 6150	Innovation and Organizational Transformation	3
<b>Electives</b>		
Complete a minimum of 9 quarter hours from the following:		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6080	Intercultural Communication	
CMN 6100	Communication Networks and Managing Information	
LDR 6120	Developing Organizational Success through Leadership Development	
LDR 6135	Ethical Leadership	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6140	Leadership Strategy, Design, and Practice	

#### PROJECT MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3

PJM 6025	Project Scheduling and Cost Planning	3
<b>Elective</b>		
Complete one of the following: <sup>1</sup>		5
PJM 6125	Project Evaluation and Assessment	
PJM 6135	Project Quality Management	
PJM 6140	Managing Troubled Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6810	Principles of Agile Project Management	

<sup>1</sup> Note: Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete Foundations of Project Management (PJM 5900) may substitute any additional project management elective to satisfy the required program hours.

## SALES MANAGEMENT

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
SMT 6010	Building Business Acumen	3
SMT 6020	Managing the Customer Experience	3
SMT 6060	Decision Support and Sales Analytics	3
<b>Elective Courses</b>		
Complete a minimum of 6 quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6060	Negotiation, Mediation, and Facilitation	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 5900	Foundations of Project Management	
PJM 6210	Communication Skills for Project Managers	
PJM 6185	Managing Innovation Projects	
SMT 6983	Topics	

## SOCIAL INNOVATION

Code	Title	Hours
<b>Required Courses</b>		
NPM 6230	Measuring Social Impact	3
NPM 6310	Social and Sustainable Entrepreneurship	3
NPM 6320	New Ventures in Social Entrepreneurship	3
<b>Electives</b>		
Complete a minimum of 6 quarter hours from the following:		
ALY 6000	Introduction to Analytics	
ALY 6010 and ALY 6070	Probability Theory and Introductory Statistics and Communication and Visualization for Data Analytics	
DGM 6285	Interactive Marketing Fundamentals	
DGM 6290	Social Media and Brand Strategy Implementation	
GST 6610	Sustainable Development	
LDR 6120	Developing Organizational Success through Leadership Development	
PJM 5900	Foundations of Project Management	
PJM 6125	Project Evaluation and Assessment	
PJM 6983	Topics	

**SOCIAL MEDIA ANALYTICS**

Code	Title	Hours
<b>Required Courses</b>		
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	3
DGM 6285	Interactive Marketing Fundamentals	4
<b>Electives</b>		
Complete a minimum of 5 quarter hours from the following:		
ALY 6000	Introduction to Analytics	
ALY 6110 and ALY 6070	Data Management and Big Data and Communication and Visualization for Data Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
DGM 6290	Social Media and Brand Strategy Implementation	

**Organizational Leadership, MS**

As today's workforce continues to be faced by new challenges, leadership tasks and responsibilities have become more important as well as more complex. The Master of Science in Organizational Leadership uses a practical, experiential learning approach to help students examine and develop their individual leadership styles while building skills that inspire and drive productive activity in all kinds of professional environments. Graduates are well able to perform at a higher level regardless of their position within the organization, demonstrate readiness for promotion, start their own business or consulting practice, take on global strategic and management challenges, and drive organizational change and innovation.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6115	Developing Strategic and Authentic Leadership Communication	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6135	Ethical Leadership	3
LDR 7980	The Capstone: Demonstrating Leadership in Action	4

**Concentration or Electives**

The remaining quarter hours may be completed by a combination of completing a concentration and additional electives or selecting any courses listed in the concentrations and elective list.

**CONCENTRATIONS**

- Coaching
- Health Management (p. 887)
- Human Resources Management (p. 887)
- Leading and Managing Technical Projects (p. 888)
- Organizational Communication (p. 888)
- Project Management (p. 888)
- Sales Management (p. 889)

**ELECTIVES**

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Organizational Leadership program.		
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6096	Cultural Communications Lab	
EDU 6184	Interdisciplinary Foundations	
HRM 6042	Strategic Workforce Planning	
HRM 6050	Employee Engagement	
HRM 6070	Global Human Resources Management	
HRM 6074	Global Talent Acquisition and Mobility	
INT 6900	International Field Study Experience	
LDR 6101	Leadership Challenge Lab	
LDR 6140	Leadership Strategy, Design, and Practice	
LDR 6145	Developing Sustainable Global Leadership	
LDR 6150	Innovation and Organizational Transformation	
LDR 6190	Leadership Coaching for Purpose and Performance	
LDR 6983	Topics	

**Program Credit/GPA Requirements**

45 total quarter hours required

Minimum 3.000 GPA required

**COACHING**

Code	Title	Hours
LDR 6190	Leadership Coaching for Purpose and Performance	3
LDR 6195	Advanced Leadership Coaching: An Interdisciplinary Approach	3
Complete three of the following:		
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6095	Foundations of Developing Cultural Awareness	
HRM 6050	Employee Engagement	
LDR 6150	Innovation and Organizational Transformation	

**HEALTH MANAGEMENT**

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6130	Healthcare Strategic Management	3
HMG 6140	Principles of Population-Based Management	3
HMG 6160	Healthcare Information Systems Management	3
HMG 6170	Health Law, Politics, and Policy	3

**HUMAN RESOURCES MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
HRM 6015	Introduction to Human Resources Management	3
HRM 6025	Workforce Analytics	3
Complete three of the following (students waived out of HRM 6015, complete four of the following):		
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	9-12
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6042	Strategic Workforce Planning	
HRM 6047	Managing the Employee Life Cycle	

HRM 6050	Employee Engagement
HRM 6060	Organizational Design
HRM 6070	Global Human Resources Management

**LEADING AND MANAGING TECHNICAL PROJECTS**

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

<sup>1</sup> Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives from the following list to satisfy the required program hours.

- Project Evaluation and Assessment (PJM 6125)
- Project Quality Management (PJM 6135)
- Managing Troubled Projects (PJM 6140)
- Introduction to Program and Portfolio Management (PJM 6710)

**ORGANIZATIONAL COMMUNICATION**

Code	Title	Hours
CMN 6000	Introduction to Organizational Communication	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6050	Crisis Communication	3
CMN 6090	Organizational Culture, Climate, and Communication	3
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	3
INT 6000	Writing Lab	1

**PROJECT MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
PJM 5900	Foundations of Project Management <sup>2</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
<b>Electives</b>		
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

<sup>2</sup> Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

**SALES MANAGEMENT**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
SMT 6010	Building Business Acumen	3
SMT 6020	Managing the Customer Experience	3
SMT 6060	Decision Support and Sales Analytics	3
<b>Elective Courses</b>		
Complete a minimum 6 quarter hours from the following:		6
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6060	Negotiation, Mediation, and Facilitation	
EAI 6020	AI System Technologies	
LDR 6110	Leading Teams Strategically in a Global Environment	
LDR 6135	Ethical Leadership	
PJM 5900	Foundations of Project Management	
PJM 6210	Communication Skills for Project Managers	
PJM 6185	Managing Innovation Projects	
SMT 6983	Topics	

**Project Management, MS**

Companies succeed or fail based on their ability to bring quality products and services to market in a timely manner. Without skilled project managers in place, companies are challenged to deliver projects on time, on budget, and according to specifications. From inception to completion, project managers are responsible for every step in the process: project definition, cost and risk estimation, schedule planning and monitoring, budget management, negotiation and conflict resolution, project leadership, and project presentation and evaluation.

The Master of Science in Project Management is designed to provide you with the practical skills and theoretical concepts you need to lead complex projects. Featuring real-world case studies, this project management degree presents techniques and tools for managing long- and short-term projects successfully and cost-effectively. Augmenting the core project management courses are concentrations that seek to provide you with content-specific expertise that enables you to deepen your knowledge in your field of interest.

In October of 2021, the Master of Science in Project Management accreditation was re-affirmed for the maximum five-year accreditation cycle (originally accredited in 2009) by the Project Management Institute Global Accreditation Center for Project Management Education Programs (GAC) (<https://www.pmi.org/>), the world's leading association for project management professionals. Accreditation is achieved by meeting the GAC's rigorous standards, which include an assessment of program objectives and outcomes, a review of onsite and online resources, evaluations of faculty and students, and proof of continuous improvements in the area of project management.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3
PJM 6135	Project Quality Management	3

The following course should be taken last:

PJM 6910	Capstone	3
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- <sup>1</sup> Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

## Concentration or Electives

The remaining required quarter hours for the program may be completed by a combination of completing a concentration, project management electives, and 6000-level electives or a combination of project management electives and selecting any courses listed in the concentrations and electives lists.

### CONCENTRATIONS

- Agile Project Management (p. 891)
- Analytics (p. 891)
- Construction Management (p. 891)
- Leadership (p. 891)
- Leading and Managing Technical Projects (p. )
- Organizational Communication (p. )
- Project Business Analysis (p. )

### PROJECT MANAGEMENT ELECTIVES

Code	Title	Hours
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

### ELECTIVES LIST

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the project management program:		
CMN 6000	Introduction to Organizational Communication	
CMN 6005	Foundations of Professional Communication	
CMN 6060	Negotiation, Mediation, and Facilitation	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6095	Foundations of Developing Cultural Awareness	
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management	
COP 6940	Personal and Career Development	
EDU 6184	Interdisciplinary Foundations	
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	

### Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

**CONCENTRATION IN AGILE PROJECT MANAGEMENT**

Code	Title	Hours
Students in this concentration are only required to complete one project management required elective.		
PJM 6205	Leading and Managing Technical Projects	3
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3
PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

**CONCENTRATION IN ANALYTICS**

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete one of the following:		
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

**CONCENTRATION IN CONSTRUCTION MANAGEMENT**

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

**CONCENTRATION IN LEADERSHIP**

Code	Title	Hours
<b>Required Courses</b>		
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6150	Innovation and Organizational Transformation	3
<b>Elective</b>		
Complete one of the following:		
LDR 6135	Ethical Leadership	
LDR 6140	Leadership Strategy, Design, and Practice	

**CONCENTRATION IN LEADING AND MANAGING TECHNICAL PROJECTS**

Code	Title	Hours
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3
PJM 6825	Agile Lean Product Development	3

**CONCENTRATION IN ORGANIZATIONAL COMMUNICATION**

Code	Title	Hours
<b>Required Course</b>		
CMN 6000 and INT 6000	Introduction to Organizational Communication and Writing Lab	4
<b>Electives</b>		
Complete four of the following:		12

CMN 6020	Ethical Issues in Organizational Communication
CMN 6050	Crisis Communication
CMN 6060	Negotiation, Mediation, and Facilitation
CMN 6080	Intercultural Communication
CMN 6090	Organizational Culture, Climate, and Communication
CMN 6110	Group Dynamics and Interpersonal Conflict: Meeting Management

**CONCENTRATION IN PROJECT BUSINESS ANALYSIS**

Code	Title	Hours
PJM 6185	Managing Innovation Projects	3
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

**Regulatory Affairs, MS**

The rapid advancement of technology within healthcare and other sectors has driven the evolution of a complex global regulatory landscape and concurrently created the need for professionals with the skills necessary to facilitate the commercialization of products used therein. In response to this demand, Northeastern University's College of Professional Studies offers the Master of Science in Regulatory Affairs degree.

This unique graduate degree is designed to both broaden and deepen the student's understanding of current global compliance requirements and their practical application in the design, development, approval, and postmarketing of products utilized within regulated industries. Courses within this degree program offer students an opportunity to integrate scientific and technical knowledge and engineering and regulatory perspectives within the larger context of global product commercialization. From research and discovery through the postmarket phase of product utilization, the Master of Science in Regulatory Affairs degree examines the processes required for stakeholders to maintain compliance to product standards and regulations throughout the global marketplace.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
BTC 6210	Human Experimentation: Methodological Issues Fundamentals	4
RGA 6002	Introduction to Regulatory Compliance and Practice	2
RGA 6203 or RGA 6204	Pharmaceutical and Medical Device Law: Topics and Cases Legal Issues in International Food, Drug, and Medical Device Regulation	5
RGA 6212	Introduction to Safety Sciences	4
RGA 6463	Regulatory Strategy for Product Development and Life-Cycle Management	4

**Capstone**

Code	Title	Hours
RGA 6300	Practical Applications in Global Regulatory Affairs	4

The remaining quarter hours may be completed by selecting a combination of a concentration and additional electives or selecting any courses listed in the concentrations and electives lists.

**Concentrations**

- Biopharmaceutical Regulatory Affairs (p. 893)
- Clinical Research Regulatory Affairs (p. 893)

- Medical Device Regulatory Affairs (p. 894)
- Nonclinical Biomedical Product Regulation (p. 894)
- Quality Assurance Compliance (p. 894)

## Program Credit/GPA Requirements

45 total quarter hours required

Minimum 3.000 GPA required

## Elective Courses

Code	Title	Hours
<b>General Electives</b>		
COP 6940	Personal and Career Development	
EDU 6184	Interdisciplinary Foundations	
INT 6943	Integrative Experiential Learning	
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6215	Project Management in Early Drug Discovery and Development	
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6219	Advanced Topics in Advertising and Promotion of Drugs and Medical Devices	
RGA 6255	Global Convergence of Regulatory Science and Reimbursement/Market Access	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
<b>Regulatory Affairs of Food</b>		
GST 6350	Global Economics of Food and Agriculture	
GST 6610	Sustainable Development	
GST 6102	Global Corporate Social Responsibility	
RFA 6220	Food Safety and Surveillance: Concepts and Applications	
<b>International Regulatory Affairs</b>		
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6222	European Medical Device Regulations	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6228	Managing International Clinical Trials	
RGA 6228	Managing International Clinical Trials	
RGA 6243	Medical Device Product Development in Canada	
RGA 6244	Therapeutic Product Development in Canada	

## Concentrations

### BIOPHARMACEUTICAL REGULATORY AFFAIRS

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

### CLINICAL RESEARCH REGULATORY AFFAIRS

Code	Title	Hours
BTC 6211	Validation and Auditing of Clinical Trial Information	4
BTC 6213	Clinical Trial Design Optimization and Problem Solving	4
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
or RGA 6202	Medical Device Development: A Regulatory Overview	
Complete one of the following:		4

RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market
RGA 6228	Managing International Clinical Trials

**MEDICAL DEVICE REGULATORY AFFAIRS**

Code	Title	Hours
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
Complete one of the following:		6
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

**NONCLINICAL BIOMEDICAL PRODUCT REGULATION**

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
RGA 6420	Global IVD Regulations and Submissions	4

**QUALITY ASSURANCE COMPLIANCE**

Code	Title	Hours
Complete one of the following:		2
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
Complete the following:		
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
RGA 6275	Product Development and Process Validation	2
Choose from the following to reach 16 quarter hours:		4
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RFA 6220	Food Safety and Surveillance: Concepts and Applications	

**Sports Leadership, MSLD**

The practice-oriented sports leadership master's degree is structured to accommodate midcareer athletic administrators and coaches, as well as individuals seeking to prepare for careers in the sports industry.

Developed in collaboration with Northeastern University's Center for the Study of Sport in Society, the Master of Sports Leadership seeks to prepare you for a variety of sport-related occupations—whether it's working with a professional or intercollegiate sports team; with a fitness club or wellness organization; or in marketing, communication, or sports management. Courses within this unique graduate degree examine the social and business issues that are critical to sports leadership. Offered in an online format with intensive one-week institutes in Boston and Charlotte, this practice-oriented degree seeks to provide you with a well-rounded educational experience, equipping you to advance your career in the sports industry.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
LDR 6400	Sports Management	3
LDR 6405	Sport in Society <sup>1</sup>	3
LDR 6410	Leadership and Organization in Sport	3
LDR 6430	Sports Law	3
LDR 6441	Sports Media Relations <sup>1</sup>	3

<sup>1</sup> Summer institute courses are delivered on-ground on the Boston campus. Winter institute courses are delivered on-ground on the Charlotte campus.

## Internship/Capstone

Code	Title	Hours
Complete one of the following. This course should be the last course taken and requires faculty advisor approval:		3
LDR 6961	Internship	
LDR 6980	Capstone	

The remaining 27 of 45 quarter hours may be completed by a combination of completing a concentration and additional electives or by selecting any courses listed in the concentrations and electives lists.

## Concentrations

- Professional Sports Administration (p. 896)
- Collegiate Athletics Administration (p. 896)
- Analytics (p. 896)
- eSports (p. 896)

## Electives List

Code	Title	Hours
Complete courses from the 6000 level. Below is a list of courses regularly offered as electives within the Sports Leadership program:		
ALY 6000	Introduction to Analytics	
ALY 6015	Intermediate Analytics	
ALY 6010	Probability Theory and Introductory Statistics	
ALY 6070	Communication and Visualization for Data Analytics	
CMN 6040	Consumer Behaviors in the Online Environment	
DGM 6400	Game Design Fundamentals	
DGM 6516	Virtual and Augmented Reality (VR/AR)	
EDU 6184	Interdisciplinary Foundations	
INT 6943	Integrative Experiential Learning	
LDR 6323	Event Management	
LDR 6427	Gender and Diversity in Sport	
LDR 6435	Fiscal Practices in Sports	
LDR 6440	Sports Marketing and Promotions	
LDR 6442	Athletic Fund-Raising	
LDR 6443	Ticket Sales and Strategies	
LDR 6445	Corporate Sponsorships	
LDR 6465	Title IX	
LDR 6455	NCAA Compliance	
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	

LDR 6480	The Business of eSports
LDR 6615	Academic Advising for Student-Athletes

## Program Credit/GPA Requirements

45 total quarter hours required  
Minimum 3.000 GPA required

### PROFESSIONAL SPORTS ADMINISTRATION

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6445	Corporate Sponsorships	3
LDR 6443	Ticket Sales and Strategies	3
LDR 6460	Risk Management in Athletics	3

### COLLEGIATE ATHLETICS ADMINISTRATION

Code	Title	Hours
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3
LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	3
LDR 6615	Academic Advising for Student-Athletes	3

### ANALYTICS

Code	Title	Hours
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3
Complete two of the following:		6
ALY 6020	Predictive Analytics	
ALY 6030	Data Warehousing and SQL	
ALY 6040	Data Mining Applications	
ALY 6110	Data Management and Big Data	

### ESPORTS

Code	Title	Hours
CMN 6040	Consumer Behaviors in the Online Environment	3
LDR 6323	Event Management	3
LDR 6480	The Business of eSports	3
LDR 6445	Corporate Sponsorships	3
DGM 6400	Game Design Fundamentals	4
DGM 6516	Virtual and Augmented Reality (VR/AR)	2

## Graduate Certificate Programs

Gain a competitive advantage and stand out in the job market with a graduate certificate from Northeastern University's College of Professional Studies. With over 40 certificates available in fields such as education, project management, leadership, and technology, you'll find a flexible and convenient way to build your skills and career potential. To accommodate your life, courses are offered online, on campus, or in a hybrid format.

### Programs

- 3D Animation (p. 897)
- Agile Project Management (p. 898)
- Applied Analytics (p. 899)
- Biopharmaceutical Regulatory Affairs (p. 900)

- Cloud Computing Application and Management (p. 900)
- Collegiate Athletics Administration (p. 901)
- Construction Management (p. 902)
- Cross-Cultural Communication (p. 902)
- Digital Media Management (p. 903)
- Digital Video (p. 904)
- eSports (p. 904)
- Experiential Teaching and Learning (p. 905)
- Financial Markets and Institutions (p. 906)
- Forensic Accounting (p. 906)
- Fundraising and Development (p. 907)
- Game Design (p. 908)
- Geographic Information Systems (p. 908)
- Global Studies and International Relations (p. 909)
- Health Management (p. 910) (*Admissions to this program have been suspended*)
- Higher Education Administration (p. 910)
- Human-Centered Informatics (p. 911)
- Human Resources Management (p. 912)
- Information Security Management (p. 913)
- Insurance Analytics and Management (p. 913)
- Integrative Health and Wellness (p. 914) (*Admissions to this program have been suspended*)
- Interactive Design (p. 915)
- International Biopharmaceutical Regulatory Affairs (p. 915)
- Leadership (p. 916)
- Leading and Managing Technical Projects (p. 917)
- Learning Experience Design and Technology (p. 918)
- Medical Device Regulatory Affairs (p. 919)
- Nonclinical Biomedical Product Regulation (p. 920)
- Nonprofit Management (p. 921)
- Organizational Communication (p. 921)
- Professional Sports Administration (p. 922)
- Project Business Analysis (p. 923)
- Project Management (p. 924)
- Public and Media Relations (p. 925)
- Quality Assurance Compliance (p. 925)
- Remote Sensing (p. 926)
- Social Media for Organizational Performance
- Usability (p. 928)

### 3D Animation, Graduate Certificate

3D animation is not only a major component in the film and broadcast industries, it is also a crucial element in online entertainment and a driving force for the gaming industry. Companies use animation in advertisements, websites, and training programs. The growing use of gaming technologies in education and industry (often referred to as serious games) has given rise to a need for skilled animators who can work closely with business and academic institutions.

The Graduate Certificate in 3D Animation offers a practice-oriented approach to the art and science of animation, with a particular emphasis on the special requirements of 3D modeling and animating for the gaming industry. Course work is designed to develop students' powers of visualization as well as provide a conceptual basis for visual narrative. The program seeks to produce graduates who are skilled in the use of industry-standard animation applications; understand visual principles of lighting, modeling, and surfacing; and are conversant with motion and special effects compositing.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
DGM 6450	Animation Basics	4
DGM 6510	3D Modeling	4
DGM 6530	Character Animation	4

### Elective Courses

Code	Title	Hours
Complete a minimum of four quarter hours from the following:		
DGM 6515	Introduction to After Effects	
DGM 6535	Rigging Principles and Techniques	
DGM 6540	Compositing	

### Program Credit/GPA Requirements

16 quarter hours required

Minimum 3.000 GPA required

### Agile Project Management, Graduate Certificate

Northeastern University's graduate certificate in agile is designed to empower students to explore agile principles and practice and remain up-to-date with current trends in the agile framework. The increasingly important role of agile practitioners and managers is becoming clear as agile business development processes are being adopted by major companies because of its high degree of success in achieving improved time to market, reducing costs, and increasing overall customer satisfaction.

The graduate certificate in agile is led by highly credentialed faculty members that are agile practitioners with decades of experience in helping companies successfully implement agile in their organizations.

Through courses you take online, our agile graduate certificate project management curriculum will give you the opportunity to:

- Develop a strong framework and understanding of the role of agile management
- Develop an understanding of the agile management processes and methodologies
- Develop an understanding of how an agile approach to managing projects can deliver value to the organization
- Develop a personal leadership strategy for success as an agile practitioner
- Develop an agile evaluation plan to measure success

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6810	Principles of Agile Project Management	3
PJM 6815	Advanced Agile Project Management	3

PJM 6820	Agile Implementation and Governance	3
PJM 6825	Agile Lean Product Development	3

- <sup>1</sup> Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management elective credits to satisfy the required credits for the program.

## Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	1-4
INT 6943	Integrative Experiential Learning	3
PJM 6075	Project Finance	3
PJM 6125	Project Evaluation and Assessment	3
PJM 6140	Managing Troubled Projects	3
PJM 6145	Global Project Management	3
PJM 6175	Project Resource Management	3
PJM 6180	Project Stakeholder Management	3
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6710	Introduction to Program and Portfolio Management	3
PJM 6983	Topics	1-4

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

## Applied Analytics, Graduate Certificate

In a global environment characterized by digital transformation, rapid change, and high levels of uncertainty, the ability to hire, reskill, and upskill analytic talent is a major driver of organizational performance. The Graduate Certificate in Applied Analytics in the College of Professional Studies is designed to prepare students to develop analytical skills that will support decision making in an organization's strategy. The certification focuses on data discipline: navigating the sea of information that's generated by machines; technical ability: understanding how machines function and how to interact with them; and the human discipline: what humans can do that machines, for the foreseeable future, cannot emulate—all with an emphasis on experiential learning. Students also will have the opportunity to tailor their studies to support their specific career objectives.

To address the needs of students who are currently in an analytical role, as well as those who are new to the field, the certification curriculum incorporates a broad menu of course options and a pathway through the program based on a student's experience level, as well as concentrations that are aligned with student career objectives.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required Core Courses

Code	Title	Hours
<b>Required Courses</b>		
ALY 6000	Introduction to Analytics	3
ALY 6010	Probability Theory and Introductory Statistics	3
ALY 6015	Intermediate Analytics	3
ALY 6070	Communication and Visualization for Data Analytics	3

**Electives**

Complete two of the following:

6

ALY 6020	Predictive Analytics
ALY 6030	Data Warehousing and SQL
ALY 6040	Data Mining Applications
ALY 6110	Data Management and Big Data

**Program Credit/GPA Requirements**

18 total quarter hours required

Minimum 3.000 GPA required

**Biopharmaceutical Regulatory Affairs, Graduate Certificate**

The biotechnology and pharmaceutical industries continue to experience rapid growth in the U.S. market. As companies in these industries seek approval to market their products in the United States, demand for qualified regulatory affairs professionals continues to increase. Product development scientists, marketers, quality personnel, as well as legal experts that guide companies through the Food and Drug Administration (FDA) approval process, will benefit from regulatory affairs training.

The Graduate Certificate in Biopharmaceutical Regulatory Affairs is designed to provide students with a greater understanding of U.S. biologic and pharmaceutical product regulation and their unique development, marketing, manufacturing, and postmarket approval-related issues. The program also seeks to prepare students to ensure regulatory compliance, proper validation, and utilization of proper quantitative measurement techniques. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6101	Therapeutic Product Development: A Regulatory Overview	4
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6380	Advanced Regulatory Writing: New Drug Applications	4
Complete one of the following:		4
RGA 6217	Biomedical Product Development: From Biotech to Boardroom to Market	
RGA 6235	Emerging Product Categories in the Regulation of Drugs and Biologics	

**Program Credit/GPA Requirements**

18 total quarter hours required

Minimum 3.000 GPA required

**Cloud Computing Application and Management, Graduate Certificate**

Cloud computing is the delivery of computing services over the internet. Due to the relatively lower cost of IT solutions, many organizations have started to take advantage of cloud services provided by Amazon Web Services, Microsoft Azure, IBM Cloud and SoftLayer, Google Cloud Platform, Salesforce, and so on. These web service providers offer a broad range of global cloud-based IT products, including computing technologies, storage, databases, analytics, networking, mobile, developer tools, management tools, Internet of Things connectivity, and security and enterprise applications. These services can help organizations move faster, facilitate agile development, and better manage scalability.

The cloud computing application and management (CCA&M) graduate certificate offers students an opportunity to develop technical and management skills to address the needs of enterprise IT services. They study theoretical and practical aspects of distributed systems from both technical and business perspectives. Successful students will be able to identify frameworks, techniques, and existing IT solutions to manage

internet services at different levels (infrastructure, platform, and software) and will also be able to demonstrate the ability to use APIs to integrate applications and business operations into the cloud. They can be directly employed by web service providers or instead work as IT solutions managers in organizations that contract with web service providers.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ITC 6420	Introduction to Cloud Computing Applications and Management	3
ITC 6450	Advanced Cloud Computing Applications and Management	3
ITC 6015	Enterprise Information Architecture	3
ITC 6460	Cloud Analytics	3
ITC 6520	Network Protection and Cloud Security	3
Complete one of the following:		3-4
ITC 6355	Web Application Design and Development	
ITC 6470	Enterprise Data Storage and Management Technologies	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	

### Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Collegiate Athletics Administration, Graduate Certificate

College athletics in the United States is comprised of more than 1,200 schools, conferences, and organizations that collectively invest in the well-being of student-athletes—both on and off the field.

The Graduate Certificate in Collegiate Athletics Administration offers students an opportunity to obtain an in-depth understanding of the largest amateur segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire leadership skills and knowledge in a variety of collegiate athletics topics including sports management, NCAA compliance, fund-raising, academic advising, gender and diversity in sport, and Title IX legislation.

Credits earned in this certificate may be used to satisfy some of the degree requirements Master of Sports Leadership (p. 894) program. For further information see the Seeking More Than One Certificate or Degree (p. 838) page.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
LDR 6427	Gender and Diversity in Sport	3
LDR 6442	Athletic Fund-Raising	3

LDR 6455	NCAA Compliance	3
LDR 6465	Title IX	3
LDR 6470	Bystander Strategies for the Prevention of Gender-Based Violence	3
LDR 6615	Academic Advising for Student-Athletes	3

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Construction Management, Graduate Certificate

Over the last two decades, construction in both the public and private sector has become increasingly complex, requiring construction and project managers to have a stronger skill base to be successful in acquiring and executing projects.

The Graduate Certificate in Construction Management is intended to serve owners' representatives, consulting engineers, architects, design engineers, contractors, and subcontractors. Individuals who have a bachelor's degree, but not necessarily in construction, and who have been identified by their companies as having high potential for advancement are also good candidates for this program.

Courses from this certificate may be applied toward the Master of Science in Project Management.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
CMG 6400	Introduction to Construction Management	4
CMG 6402	Alternative Project Delivery Methods and Project Controls	4
CMG 6403	Safety, Project Risk, and Quality Management	4
CMG 6405	Construction Law	4

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Cross-Cultural Communication, Graduate Certificate

The Graduate Certificate in Cross-Cultural Communication will help to equip professionals with the knowledge and competencies to:

- Analyze personal cross-cultural awareness and implicit bias, in addition to interpret organizational cross-cultural communication strategy to develop effective communication processes and activities
- Evaluate communication audiences from a holistic perspective, thereby constructing effective verbal and nonverbal interactions based on cross-cultural consumption
- Formulate enlightened cross-cultural communication and inclusive diversity strategies, processes, and policies
- Demonstrate critical thinking skills through research, case analysis, role-plays, and experiential learning demonstrating agility, quick response, and diplomacy employing cross-cultural communication strategies

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CMN 6085	Strategies for Cross-Cultural Facilitation and Negotiation	3
CMN 6095	Foundations of Developing Cultural Awareness	3

### Elective Courses

Code	Title	Hours
Choose from the following:		
CMN 6096	Cultural Communications Lab	10
GST 6100	Globalization and Global Politics and Economics	
GST 6101	Global Literacy, Culture, and Community	
HRM 6070	Global Human Resources Management	
INT 6900	International Field Study Experience	
ITC 6045	Information Technology Policy, Ethics, and Social Responsibility	
LDR 6145	Developing Sustainable Global Leadership	
NPM 6230	Measuring Social Impact	
PBR 6100	Introduction to Public Relations	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Digital Media Management, Graduate Certificate

The digital media market space can present unexpected challenges to standard business models. The Graduate Certificate in Digital Media Management offers courses designed to help managers apply best business practices to these nontraditional challenges. Students are offered the opportunity to gain skills in managing functionally diverse digital media teams, responding effectively to response-critical projects, and implementing marketing strategy in a variety of media channels.

Courses in the program were selected by faculty from the College of Professional Studies' Master of Professional Studies in Digital Media. The certificate consists of courses selected from the MPS in Digital Media (p. 860) curriculum.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
DGM 6279	Project Management for Digital Media	4
DGM 6280	Managing for Digital Media	4
DGM 6285	Interactive Marketing Fundamentals	4
Complete one of the following:		
DGM 6230	Digital Media Entrepreneurship	4
DGM 6290	Social Media and Brand Strategy Implementation	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Digital Video, Graduate Certificate

With the quality and ease of use of digital video camcorders, anyone can capture moving images, but the result is like a Stradivarius violin: It takes training to make music. The Graduate Certificate in Digital Video is a hands-on introduction to digital video technologies, as well as an examination of the social, cultural, and political implications of moving-image production in the digital age. Students have an opportunity to gain competency in digital production and postproduction while exploring various formal, conceptual, and structural strategies. Students will also have an opportunity to learn to generate digital video that communicates effectively and inventively, in preparation for positions in the creative industries of gaming, design, and media production.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
DGM 6435	Digital Video Production	4
DGM 6440	Editing in the Digital Studio	4
DGM 6506	Introduction to Digital Video	2
DGM 6540	Compositing	4
Complete one of the following:		2
DGM 6515	Introduction to After Effects	
DGM 6516	Virtual and Augmented Reality (VR/AR)	

### Elective

Code	Title	Hours
Complete one of the following:		4
DGM 6520	Lighting for the Camera	
DGM 6545	Documentary and Nonfiction Production	

## Program Credit/GPA Requirements

20 total quarter hours required  
Minimum 3.000 GPA required

### eSports, Graduate Certificate

## Overview

Students will have the opportunity to take specialized courses that focus on the emerging eSports field. The certificate is designed for professionals in sports leadership careers who want to have a deeper understanding of eSports. It also provides a pathway to prepare sports and gaming enthusiasts with a combination of coursework across graduate programs to confidently enter this emerging sports sector. This is in keeping with the commitment to serve diverse students who may want to explore a nontraditional learning path as they consider a new career or wish to continue career development in sync with changes occurring in the profession around them.

Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Sports Leadership program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### **Required Courses**

Code	Title	Hours
CMN 6040	Consumer Behaviors in the Online Environment	3
DGM 6400	Game Design Fundamentals	4
DGM 6516	Virtual and Augmented Reality (VR/AR)	2
LDR 6323	Event Management	3
LDR 6445	Corporate Sponsorships	3
LDR 6480	The Business of eSports	3

### **Program Credit/GPA Requirements**

18 total quarter hours required

Minimum 3.000 GPA required

### **Experiential Teaching and Learning, Graduate Certificate**

Experiential learning has been documented to be an effective pedagogy for promoting deeper learning, fostering student engagement, and ultimately closing the opportunity gap for underserved students. However, many educators and educational leaders are not familiar with best-practice strategies for leading, practicing, and researching experiential learning in their classrooms and therefore need themselves to become adult learners to begin the process of pedagogical transformation.

The Graduate Certificate in Experiential Teaching and Learning is designed to provide K–12 experiential educators with the knowledge, skills, and attitudes needed to design, facilitate, research, and lead engaging and meaningful learning experiences. The program explores the theoretical foundations, approaches, and strategies for learning through experience and how to apply these competencies with a commitment toward fostering educational equity.

Classroom teachers who are interested in transforming their practice as well as educators who are interested in seeking out leadership roles within schools will benefit from earning the Graduate Certificate in Experiential Teaching and Learning as the certificate covers content and skills needed for leading both student and adult experiential learning.

The certificate is comprised of 16 quarter hours, which may be applied toward the Master of Education in Learning and Instruction.

### **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### **Required Courses**

Code	Title	Hours
EDU 6001	Experiential Learning Theory and Practice	4
EDU 6002	Culturally Responsive Experiential Teaching and Learning	4
EDU 6003	Applied Research in Experiential Teaching and Learning	4
EDU 6004	Leading Experiential Teaching and Learning	4

### **Program Credit/GPA Requirements**

16 total quarter hours required

Minimum 3.000 GPA required

## Financial Markets and Institutions, Graduate Certificate

In this rapidly changing business environment, the barriers between institutions are eroding, and competition is increasing due to deregulation and new product development. Managing internal operations more efficiently and adapting to the changing external environment is critical to the long-term survival of institutions. The Graduate Certificate in Financial Markets and Institutions seeks to prepare students to measure the impact of accounting decisions on performance; to manage risks, assets, and liabilities to meet corporate goals; to understand domestic and international financial systems and the institutions within them; and to build financial relationships that foster marketing financial products.

An examination of financial services industry principles and practices seeks to provide individuals working in brokerage houses, investment or commercial banks, insurance companies, or real estate with a greater understanding of financial systems as well as how to manage risks, assets, and liabilities in meeting corporate goals.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
FIN 6101	Accounting Fundamentals for Financial Institutions	3
FIN 6102	Asset and Liability Management	3
FIN 6120	Building Financial Relationships	3
FIN 6161	Investment Analysis	3
Complete four quarter hours of the course below:		
CED 6995	Project	4

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

## Forensic Accounting, Graduate Certificate

News surrounding corporate corruption has had a significant impact on businesses, particularly the accounting industry. In response, the government has enacted sweeping accounting and business laws such as the Sarbanes-Oxley 2002 legislation. Additionally, many professional organizations, including the American Institute of Certified Public Accountants (AICPA) and the Association of Certified Fraud Examiners (ACFE), have made the prevention, detection, and prosecution of fraud and accounting abuse a priority.

This **four-course graduate certificate in forensic accounting** is designed to help students apply techniques in identifying, collecting, and examining evidence, including how to identify financial statement misrepresentation, transaction reconstruction, and tax evasion.

*Note:* Courses from this certificate may not be applied toward the Master of Science in Leadership.

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Courses should be taken in the following sequence:

Code	Title	Hours
ACC 6210	Forensic Accounting Principles	3
ACC 6220	Dissecting Financial Statements	3
ACC 6230	Investigative Accounting and Fraud Examination	3
ACC 6240	Litigation Support	3
Complete the following course for four quarter hours:		4
CED 6995	Project	

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Fundraising and Development, Graduate Certificate

This Graduate Certificate in Fundraising and Development is designed to prepare students for a career in fundraising and development roles, or provide a transition for a more comprehensive curriculum within the Master of Science in Nonprofit Management. The certificate seeks to provide expert-level skills to students who want to gain experience with the fundraising and development fields using current industry tools and techniques through a student-centered curriculum. Courses are designed to provide a solid foundation of knowledge on fundraising and development, which are areas in the nonprofit field experiencing growth and increased career opportunities.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
NPM 6130	Fundraising and Development for Organizations	3
NPM 6140	Grant and Report Writing	3
NPM 6220	Donor Research and Management	3
NPM 6230	Measuring Social Impact	3
NPM 6240	Managing the Annual Fund	3

## Elective Courses

Code	Title	Hours
Choose from the following:		1
CMN 6096	Cultural Communications Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6000	Writing Lab	
NPM 6100	Strategic Management for the Nonprofit Sector	
NPM 6210	Social Value Investing and Effective Partnerships	
NPM 6995	Project	
PBR 6001	Communications Technology Lab	

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

## Game Design, Graduate Certificate

Game design is one of the fastest-growing fields in entertainment, business, and education. From healthcare to political science, companies use games to educate their constituents and enhance employee skills.

The Graduate Certificate in Game Design offers a practice-oriented approach to the art and science of game making. The program emphasizes visual design and programming for video games and fosters conceptual understanding of the principles of game design for all varieties of games—from educational board games to iPhone games.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6400	Game Design Fundamentals	4
DGM 6403	Game Engine Fundamentals	4
DGM 6405	Game Development	4
DGM 6410	Game Design Technology Lab	4

### Program Credit/GPA Requirements

20 total quarter hours required

Minimum 3.000 GPA required

## Geographic Information Systems, Graduate Certificate

A geographic information system (GIS) combines layers of data to give needed information on specific locations. Such a system can map environmental sensitivities or geological features or can report on how best to speed emergency personnel to an accident or crime scene. Current fields using GIS include healthcare, public safety, environmental management, transportation and operations technology, real estate, and public utilities.

The Graduate Certificate in Geographic Information Systems program offers hands-on training, seeking to give students the necessary skills and understanding to apply GIS competently and effectively. As a result of the certificate curriculum, students should be well versed in GIS theory, have practical hands-on exposure to GIS software and hardware, understand the representation of data in both mapped and tabular forms, and know how to plan and construct spatial databases.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
GIS 5103	Foundations of Geographic Information Science	4
RMS 5105	Fundamentals of Remote Sensing	3
GIS 5201	Advanced Spatial Analysis	3

## Electives

Code	Title	Hours
Complete two of the following:		6
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
GIS 6320	Use and Applications of Free and Open-Source GIS Desktop Software	
GIS 6340	GIS Customization	
GIS 6345	Geospatial Programming	
GIS 6350	Planning a GIS Implementation	
GIS 6360	Spatial Databases	
GIS 6370	Internet-Based GIS	
GIS 6385	GIS/Cartography	
GIS 6983	Topics	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Global Studies and International Relations, Graduate Certificate

The Graduate Certificate in Global Studies and International Relations is designed to provide students with the skills and training necessary to analyze, research, and evaluate a topic of interest in a global location. Overall, the program curriculum focuses on the themes of transition and development in the global world. Core courses provide a base of knowledge about global issues and are combined with an elective that allows students to focus on a specific area of interest.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
GST 6100	Globalization and Global Politics and Economics	4
GST 6101	Global Literacy, Culture, and Community	4
GST 6320	Peace and Conflict	4

## Elective

Code	Title	Hours
Complete one of the following:		4
GST 6501	Regional Studies: East Asia	
GST 6502	Regional Studies: Middle East and North Africa	
GST 6503	Regional Studies: Sub-Saharan Africa	
GST 6504	Regional Studies: Europe and Eurasia	
GST 6505	Regional Studies: Southwest and Central Asia	
GST 6506	Regional Studies: Latin America	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Health Management, Graduate Certificate

**Admissions to this program have been suspended.**

Projections for the healthcare industry state that job growth will remain above average into the next decade. The needs of an aging population along with the increased human life cycle are just some of the factors contributing to this growth.

The Graduate Certificate in Health Management examines the financial, political, legal, and operational aspects of a healthcare facility and explores the evolution of healthcare delivery in the United States.

Health managers are found in different roles across healthcare organizations including:

- Strategic planning
- Operations
- Human resources
- Fund-raising
- Purchasing

Health managers are responsible for designing, administering, managing, and evaluating health policies, programs, and services. The courses in this certificate also serve as a concentration in the Master of Science in Leadership program.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
HMG 6110	Organization, Administration, Financing, and History of Healthcare	3
HMG 6120		3
NPM 6120	Financial Management for Nonprofit Organizations	3
HMG 6130	Healthcare Strategic Management	3

### Elective Courses

Code	Title	Hours
Complete two of the following (minimum of 6 quarter hours):		6
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	
NPM 6150	Human Resources Management in Nonprofit Organizations	
HMG 6140	Principles of Population-Based Management	
HMG 6160	Healthcare Information Systems Management	
HMG 6170	Health Law, Politics, and Policy	
HRM 6020	Talent Acquisition and Onboarding	

## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Higher Education Administration, Graduate Certificate

Institutions of higher education around the world are facing considerable pressures that range from changing demographics to financial strain amid disruptions unimaginable 20 years ago. Administrators must develop foundational skills to create conditions that allow their students and institutions to thrive in a constantly changing world. The Graduate Certificate in Higher Education Administration is designed to prepare practitioners for the unique and difficult challenges facing the next generation of higher education professionals. This program allows students the flexibility to build upon their skills in a customized manner with a focus on practical skills and course designs firmly grounded in experiential learning.

The Graduate Certificate in Higher Education Administration program seeks to prepare students with the knowledge to understand the structure, governance, and operation of various higher education organizations. Within the context of classes, students have an opportunity to develop solutions to real-world problems.

## Unique Features

- The ability to complete the program 100 percent while accessing and contributing to an extensive professional network—critical in the world of higher education.
- Northeastern faculty who are currently meaningfully engaged in the field, bringing their practical expertise to our students.
- The integration of experiential projects within several courses allowing students to develop practical skills.
- Credits can be applied toward the Master of Education, Higher Education Administration (p. 852) program.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Core Courses

Code	Title	Hours
EDU 6202	Faculty, Curriculum, and Academic Community	4
EDU 6205	The Demographics of the New College Student	4
EDU 6219	Higher Education Law and Policy	4

### Elective

Code	Title	Hours
Complete one of the following:		4
EDU 6217	The History of Colleges and Universities	
EDU 6218	Money Matters: Financial Management in Higher Education	
EDU 6224	Strategic Leadership in Enrollment Management	
EDU 6234	Program Evaluation, Assessment, and Accreditation in Higher Education	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Human-Centered Informatics, Graduate Certificate

Human-centered informatics (HCI) focuses on the design, development, and evaluation of IT systems with a particular emphasis on the relations and interactions between people and IT systems. The emphasis of understanding users experience when they interact with technology in the information-rich environment and the design of interfaces between users and systems makes it different from the focus of software engineering programs or visual and artistic design programs.

The human-centered informatics graduate certificate offers students the opportunity to learn the theories of cognitive and social psychology as well as universal principles of design adopted in human-computer interaction. Students develop the technical skills to study user experience in various IT environments (home, business, social media, healthcare, etc.), focusing on user needs, information architecture, and design of user interfaces. Successful students that graduate with the HCI graduate certificate will be able to propose innovative or improve design solutions to real-world problems.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
ITC 6410	Fundamentals of Human Behaviors for Interactive Systems	3
DGM 6461	Interactive Information Design 1	4
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
<b>Elective</b>		
Complete one of the following:		3-4
DGM 6463	Interactive Information Design 2	
ALY 6070	Communication and Visualization for Data Analytics	
ITC 6355	Web Application Design and Development	

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Human Resources Management, Graduate Certificate

In today's multifaceted organizations, human resource professionals must respond to the growing challenges of regulatory compliance, complex benefit plans, and training and motivating employees.

The Graduate Certificate in Human Resources Management seeks to foster a deep understanding of organizational development and effective change management, workforce planning and strategic recruitment, and training and performance management.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
HRM 6015	Introduction to Human Resources Management <sup>1</sup>	3
HRM 6025	Workforce Analytics	3
HRM 6042	Strategic Workforce Planning	3

<sup>1</sup> This course is for students with less than two years of human resources experience. Students who do not complete this course take electives to satisfy required program credits.

## Electives

Code	Title	Hours
Complete seven quarters hours of the following:		
CMN 6096	Cultural Communications Lab	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
HRM 6010	Compensation and Benefits	
HRM 6020	Talent Acquisition and Onboarding	
HRM 6030	The Employment Contract	
HRM 6035	Digital Human Resources Platforms	

HRM 6047	Managing the Employee Life Cycle
HRM 6050	Employee Engagement
HRM 6060	Organizational Design
HRM 6070	Global Human Resources Management

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Information Security Management, Graduate Certificate

Information security is a management issue with global business implications. To succeed in today's network economy requires more than simply a focus on information technology (IT) issues. Succeeding also requires a focus on security strategy and management. IT security governance is an overarching consideration in all risk-assessment and management-related endeavors and is important for information security since many issues have legal, regulatory, policy, and ethical considerations. The associated risks of business today must be clearly understood and managed.

The Graduate Certificate in Information Security Management is designed to provide a conceptual and practical overview of information security management. It begins with an overview of key information security management issues and principles. It presents security governance challenges including the policy, law, regulatory, and ethical accountability frameworks that information security risk managers must work within. The program includes review courses that prepare students for the Certified Information Systems Security Professional (CISSP) and Certified Information Systems Auditor (CISA) exams.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
ITC 6300	Foundations of Information Security	3
ITC 6305	IT Infrastructure (Systems, Networks, Telecom)	3
ITC 6310	Information Security Governance	3
ITC 6315	Information Security Risk Management	3
ITC 6520	Network Protection and Cloud Security	3

### Electives

Code	Title	Hours
Complete one of the following:		
ITC 6330	CISSP Preparation	3
ITC 6530	Security Analytics	

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Insurance Analytics and Management, Graduate Certificate

## Overview

Learners have an opportunity to gain appropriate technical skills, insurance design expertise, and experience needed to assume professional roles in the insurance field. Upon completion, learners should be prepared to:

- Investigate and identify opportunities to address insurance questions and/or challenges in the evolving digital agenda of the insurance industry.
- Articulate and defend the significance and implications of the intersections of application orientation, domain knowledge, digital leadership and human-centered design, decision support, and digital transformation across the insurance enterprise.
- Integrate the principles, tools, and methods of digital transformation and human-centered design to solve organizational problems by making informed decisions related to the design and deployment of systems in human environments and workflows within the organization.
- Develop a formally proposed solution and/or application, real or hypothetical, to address an insurance-related question and/or challenge.
- Apply data management and strategic analysis, problem-solving, decision-making, effective visualization/communication, and digital leadership skills to the application or deployment of technologies and products in a real-world scenario.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
<b>Core Courses</b>		
INS 6020	Claims Management	3
INS 6030	Insurance Underwriting	3
INS 6040	Introduction to Insurance Data Analytics	3
INS 6050	Intermediate Insurance Analytics	3
<b>Electives</b>		
Complete two of the following:		6
ALY 6070	Communication and Visualization for Data Analytics	
EAI 6000	Fundamentals of Artificial Intelligence	
EAI 6020	AI System Technologies	
INS 6120	Macro Challenges in Insurance	
INS 6140	Distribution and Sales	
INS 6983	Special Topics	

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Integrative Health and Wellness, Graduate Certificate

**Admissions to this program have been suspended.**

The Graduate Certificate in Integrative Health and Wellness is designed to equip students to apply cross-disciplinary approaches to patient or client health and wellness. Students explore how to interact with diverse patients or clients within a variety of settings and how to utilize a holistic model for patient care by incorporating strengths-based perspective, cross-cultural communication, resilience, advocacy, and problem solving. This certificate equips emerging and current healthcare practitioners and professionals to apply integrative well-being principles toward a wide variety of approaches and practices that create cohesive and holistic assessments and intervention plans for those they serve. Students have an opportunity to learn how to advocate for access and navigate the wide variety of care options that are available, while considering social determinants of health, patient's cultural and economic belief systems, social and mental supports, and the potential appropriate interventions. Students will work side-by-side with a multidisciplinary array of practitioners to develop the needed assessment and intervention skills to excel within the wide range of roles and applications available across integrative healthcare in our global 21<sup>st</sup>-century delivery system.

The mission of the Graduate Certificate in Integrative Health and Wellness at Northeastern University is to cultivate diverse practitioners who can use innovative assessments and resource identification tools to coordinate holistic patient care. Here, we train health practitioners and professionals on how to be agile learners, thinkers, and creators in integrative health, wellness, and resilience.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Curriculum (16 credits)

Code	Title	Hours
NTR 6105	Foundations of Integrative Health	4
NTR 6125	The Process of Health and Healing: Exploring Systems in the Body—Part 1	4
NTR 6135	The Process of Health and Healing: Exploring Systems in the Body—Part 2	4
NTR 6160	Survey of Integrative Practices and Interventions	4

### Experiential Capstone (2–4 credits)

Code	Title	Hours
NTR 7880	Wellness in Practice	2-4

## Interactive Design, Graduate Certificate

Digital media plays an increasingly significant role in the global culture and economy. The Graduate Certificate in Interactive Design offers an overview of courses in the creative process of storytelling and communicating through visuals and sound. Students have an opportunity to gain expertise in time-based design and interface and experience design through a practice-oriented problem-solving approach.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
DGM 6217	Typography for Interactivity	4
DGM 6317	Screen-Based Publication Design	4
DGM 6461	Interactive Information Design 1	4

### Elective Courses

Code	Title	Hours
Choose from the following:		
DGM 6463	Interactive Information Design 2	4
DGM 6471	Designing Infographics	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

## International Biopharmaceutical Regulatory Affairs, Graduate Certificate

To work in today's global biopharmaceutical industry, there is a strong need to understand international regulations that impact the development, marketing, and manufacturing of pharmaceutical and biotechnology products.

The Graduate Certificate in Biopharmaceutical International Regulatory Affairs curriculum focuses on factors that facilitate the safety, performance, and efficacy of biomedical goods. Program training covers the assessment of international regulations and interpretation of their likely impact on a

company's global commercialization strategies. Through participation in the program, students will have an opportunity to gain an understanding of international regulatory requirements necessary to implement such strategies.

Course work covers biotechnology and pharmaceutical product approval processes, regulatory analysis, and liability laws as they exist across different regulatory systems. The graduate certificate will provide core regulatory knowledge to students entering into the field from bench research, clinical studies, quality control/assurance, pharmacy, bioengineering, business, and legal analysis. The curriculum covers regulatory environments in Europe, Latin America, Australia, Japan, and other emerging economies. Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs for Drugs, Biologics, and Medical Devices.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
RGA 6221	European Union Compliance Process and Regulatory Affairs	4
Complete a minimum of 12 quarter hours		
RGA 6204	Legal Issues in International Food, Drug, and Medical Device Regulation	
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	
RGA 6210	Strategic Planning and Project Management for Regulatory Affairs	
RGA 6212	Introduction to Safety Sciences	
RGA 6223	Introduction to Australian, Asian, and Latin American Regulatory Affairs	
RGA 6224	Regulation of Biomedical Product Commercialization by Health Canada	
RGA 6244	Therapeutic Product Development in Canada	
RGA 6245	Regulation of Generic Pharmaceutical and Biosimilar Products	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

## Leadership, Graduate Certificate

Today's cross-functional teams and organizations require a leadership style that capitalizes on the collective expertise and capabilities of the group. The development and mastery of collaborative leadership skills are not typically part of one's focused discipline preparation; hence, leadership requires deliberate development by those who assume leadership roles.

The Graduate Certificate in Leadership starts with the premise that everyone is capable of leadership. The program studies every aspect of leadership dynamics from the leader as an individual to working in teams and from the organization itself to the development of strategic leadership techniques. Course work exposes participants to a series of alternative perspectives of leadership, including collaborative models. Using the course's action-learning methods, participants build a personal model of leadership that they can put to immediate use in their workplace.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
LDR 6100	Developing Your Leadership Capability	3
LDR 6110	Leading Teams Strategically in a Global Environment	3
LDR 6120	Developing Organizational Success through Leadership Development	3
LDR 6140	Leadership Strategy, Design, and Practice	3

## Leadership Electives

Code	Title	Hours
Complete two of the following:		6
LDR 6135	Ethical Leadership	
HRM 6005	Creating a High-Performance Organization: Strategic Organizational and HRM Choices	
LDR 6150	Innovation and Organizational Transformation	
CMN 6010	Strategic Communication Management	

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Leading and Managing Technical Projects, Graduate Certificate

Whether you're an established project manager, or you're working in a technical field and aspire to be one, Northeastern's Graduate Certificate in Leading and Managing Technical Projects seeks to give you the foundational skills and practical knowledge you need to be successful.

Through courses you take online, our technical project management curriculum will give you the opportunity to:

- Develop the leadership and management skills to lead technical projects
- Learn how to communicate technical content to a nontechnical audience
- Gain practice leading remote teams, including global teams
- Plan and schedule projects using the most current and relevant methodologies
- Develop a personal leadership approach to motivate and inspire others

Credits earned in this certificate may be used to satisfy some of the degree requirements of a College of Professional Studies master's program. For further information, see the Seeking More Than One Certificate or Degree page.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6205	Leading and Managing Technical Projects	3
PJM 6210	Communication Skills for Project Managers	3
PJM 6215	Leading Remote Project Teams	3
PJM 6810	Principles of Agile Project Management	3

- <sup>1</sup> Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete Foundations of Project Management (PJM 5900) take project management electives to satisfy required program credits.

## Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	
PJM 6710	Introduction to Program and Portfolio Management	
PJM 6983	Topics	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Learning Experience Design and Technology, Graduate Certificate

The Graduate Certificate in Learning Experience Design and Technology offers a practice-based exploration of the key skills required in the rapidly expanding field of learning design. Never before has the need for professionals with LXD expertise been so essential across all industry sectors. The certificate is designed to meet this need by grounding designers, educators, technologists, and other professionals in the art and science of effective learning design. Students will have the opportunity to build or strengthen design and technological skills that can be applied across PK–12, higher education, government, military, corporate, and nonprofit environments. Skills can be applied to learners of all ages and in online, mobile, virtual, face-to-face, and blended formats.

The program's innovative approach blends academic and workplace-based learning with a focus on how people learn, foundational learning design skills, and advanced learning design topics. Experiential opportunities are built into each course. Students will have the opportunity to develop an online portfolio of work to demonstrate their capacity to think strategically; put creative ideas into action using a variety of technologies; learning design environments that meet academic, personal, professional, and organizational goals; and interpret and clearly communicate results to stakeholders. Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Professional Studies in Learning Experience Design and Technology program.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
<b>Core Requirements</b>		
EDU 6319	How People Learn	4

EDU 6334	Foundations of Learning Experience Design	4
EDU 6335	Advanced Practices in Learning Experience Design	4

## Electives

Code	Title	Hours
Complete a minimum of 4 quarter hours from the list below to reach the program credits required		
CMN 6080	Intercultural Communication	
DGM 6501	Web Creation Boot Camp	
EDU 5978	Independent Study	
EDU 6001	Experiential Learning Theory and Practice	
EDU 6002	Culturally Responsive Experiential Teaching and Learning	
EDU 6003	Applied Research in Experiential Teaching and Learning	
EDU 6004	Leading Experiential Teaching and Learning	
EDU 6202	Faculty, Curriculum, and Academic Community	
EDU 6323	Digital Learning Tools and Technologies for LXD	
EDU 6329	Connecting Theory and Practice	
EDU 6331	E-Learning Design as a Collaborative Profession	
EDU 6332	Open Learning	
EDU 6336	Data Literacy for Data-Driven Decision Making	
EDU 6338	Learning Experience Design Studio	
EDU 6558	Issues in Education	
NPM 6140	Grant and Report Writing	
PJM 5900	Foundations of Project Management	

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Medical Device Regulatory Affairs, Graduate Certificate

The national and regional medical device industries have continued to experience significant market growth, despite the fluctuations in the overall global economy. There are more than 7,000 medical device companies in the United States alone, and nearly 1,000 of these are based in Massachusetts. In total, the medical device sector in Massachusetts employs 36,000 workers, has a payroll of over \$1.8 billion, and annual product shipments of \$7.3 billion.

The Graduate Certificate in Medical Device Regulatory Affairs provides students with an opportunity to gain a detailed knowledge of the regulations influencing the commercialization of new and existing medical devices. The intensely practical curriculum spans the entire life cycle of product development and introduces students to the salient features governing both pre- and postapproval stages. The program content also examines the relationship between regulatory agencies and the medical device industry. Students have the opportunity to take specialized courses on regulatory systems outside the United States.

The certificate will help advance the careers of students coming from such fields as bioengineering, quality control/assurance, intellectual property, business, and marketing. The choice of several courses makes this certificate ideal for students already working in the regulatory world as well as those just entering into the profession.

Courses from this certificate may be applied toward the Master of Science in Regulatory Affairs.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirement**

Code	Title	Hours
<b>Required Courses</b>		
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	2
RGA 6202	Medical Device Development: A Regulatory Overview	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
<b>Electives</b>		
Choose from the following:		6
RGA 6205	Emerging Trends and Issues in the Medical Device Industry	
RGA 6222	European Medical Device Regulations	
RGA 6243	Medical Device Product Development in Canada	
RGA 6275	Product Development and Process Validation	
RGA 6370	Advanced Regulatory Writing: Medical Device Submissions	

**Program Credit/GPA Requirements**

16 total quarter hours required

Minimum 3.000 GPA required

**Nonclinical Biomedical Product Regulation, Graduate Certificate**

The professional practice of nonclinical regulatory affairs involves understanding, developing, and applying global compliance standards to the biomedical product commercialization process in several cross-functional areas that are separate and distinct from direct clinical patient care. This includes, but is not limited to, design and preclinical development processes, including *in vitro* and *in vivo* animal testing, *in silico* testing, small-scale/large-scale manufacturing process development and validation, development and maintenance of supply chains, as well as product handling and distribution. The Graduate Certificate in Nonclinical Biomedical Product Regulation introduces students to the practice of understanding, developing, and effectively applying global nonclinical compliance standards to new healthcare technologies. Students in the certificate program have the opportunity to:

- Differentiate between the nonclinical vs. clinical aspects of the global biomedical product commercialization process from a regulatory compliance perspective
- Explain the compliance-associated requirements needed to successfully practice professional nonclinical work within the global biomedical products industry
- Describe the nonclinical regulatory standards utilized by the United States Food and Drug Administration (FDA) and other global regulatory agencies to evaluate the safety and efficacy of new and existing biomedical products employed by healthcare practitioners in various patient settings
- Apply fundamental global nonclinical regulations to the biomedical product commercialization process, including therapy design, manufacturing process development and validation, cybersecurity, and supply chain risk management

Students that successfully complete this certificate may apply their courses toward the Master of Science in Regulatory Affairs (p. 892).

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
RGA 6207	Global Impact of Electronic Common Technical Document (eCTD) Submissions	4
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4

RGA 6405	Nonclinical Regulations in Biomedical Product Commercialization	4
RGA 6420	Global IVD Regulations and Submissions	4

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Nonprofit Management, Graduate Certificate

Nonprofits today simply require a higher level of management expertise. Nonprofit managers are required to manage people and programs more efficiently and effectively. The Graduate Certificate in Nonprofit Management focuses on developing skills in organizational management, financial management, fund-raising, grant and report writing, human resources management, and governance.

The program integrates theoretical approaches with practical application to prepare students for positions in either small or large nonprofit organizations. The program targets individuals who work in the nonprofit sector as executive directors, managers, program staff, board members, and volunteers. Students have an opportunity to participate in case studies, individual and group projects, and class discussions.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
NPM 6110	Legal and Governance Issues in Nonprofit Organizations	3
NPM 6120	Financial Management for Nonprofit Organizations	3
NPM 6125	Promoting Nonprofit Organizations	3
NPM 6130	Fundraising and Development for Organizations	3
NPM 6150	Human Resources Management in Nonprofit Organizations	3

## Electives

Code	Title	Hours
Choose from the following:		1
CMN 6096	Cultural Communications Lab	
INT 6940	Experiential Learning Projects for Professionals	
INT 6000	Writing Lab	
NPM 6100	Strategic Management for the Nonprofit Sector	
NPM 6140	Grant and Report Writing	
NPM 6995	Project	
PBR 6001	Communications Technology Lab	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Organizational Communication, Graduate Certificate

The study of organizational communication focuses on the dynamics of communication in complex organizations for the purpose of learning how individuals within such organizations can become effective communicators. Whether the context of such communication is meetings or professional presentations, communicating during a crisis, or intercultural exchanges, the message is consistent: Effective communication is a crucial factor in determining organizational success.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CMN 6010	Strategic Communication Management	3
CMN 6020	Ethical Issues in Organizational Communication	3
CMN 6910	Organizational Communication Assessment	3

### Elective Courses

Code	Title	Hours
Choose from the following:		7
CMN 6080	Intercultural Communication	
CMN 6090	Organizational Culture, Climate, and Communication	
CMN 6096	Cultural Communications Lab	
CMN 6100	Communication Networks and Managing Information	
PBR 6001	Communications Technology Lab	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

## Professional Sports Administration, Graduate Certificate

The Graduate Certificate in Professional Sports Administration is designed to give students an in-depth understanding of this professional segment of the sports industry. Through the program's curriculum, students will be given the opportunity to acquire professional leadership skills and knowledge in a variety of topical areas including sports management, marketing, sponsorship, event management, risk management, and finance.

Credits earned in this certificate may be used to satisfy some of the degree requirements of the Master of Sports Leadership (p. 894) program.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
LDR 6323	Event Management	3
LDR 6435	Fiscal Practices in Sports	3
LDR 6440	Sports Marketing and Promotions	3
LDR 6443	Ticket Sales and Strategies	3
LDR 6445	Corporate Sponsorships	3
LDR 6460	Risk Management in Athletics	3

## Program Credit/GPA Requirements

18 total quarter hours required  
Minimum 3.000 GPA required

### Project Business Analysis, Graduate Certificate

At the heart of every project is requirements analysis. It's a critical skill set, leveraged across the spectrum of project work. This program provides practicing project managers with a solid framework and understanding of the process of developing requirements. It also emphasizes the need to engage stakeholders throughout the process to ensure outcomes meet the desired needs of the organization.

This graduate certificate allows you to possess an in-demand skill set. It gives you a better opportunity at finding entry-level positions as a PMO analyst or entry-level business analyst. And it prepares you with the knowledge, skills, and tools needed to create and manage requirements to meet stakeholder needs effectively.

In this program, you will:

- Develop a strong framework and understanding of the role of business analyst
- Understand and analyze the voice of the customer and explore potential solutions for their needs
- Apply tools and techniques to elicit requirements (business requirements, stakeholder requirements)
- Translate the needs of the business into clear, concise, quality requirements (solution requirements, functional and nonfunctional requirements)
- Apply analytical skills in the business analysis process
- Develop a personal leadership strategy for success as a business analyst

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6610	Foundations of Project Business Analysis	3
PJM 6620	Strategy Analysis and Needs Assessment	3
PJM 6630	Requirements Analysis and Design	3
PJM 6640	Leadership Strategies for the Business Analyst	3

<sup>1</sup> Foundations of Project Management (PJM 5900) is for students with less than three years of experience directing or leading project tasks and is recommended for students who do not have a basic working knowledge of Microsoft Project software. Students who do not complete PJM 5900 may substitute project management electives to satisfy required program hours.

### Elective Courses

Code	Title	Hours
INT 6940	Experiential Learning Projects for Professionals	
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6185	Managing Innovation Projects	
PJM 6205	Leading and Managing Technical Projects	

PJM 6210	Communication Skills for Project Managers
PJM 6215	Leading Remote Project Teams
PJM 6983	Topics

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Project Management, Graduate Certificate

Technical and managerial employees at all levels of organizations are being asked to manage small and large projects. Many of these professionals have not been specifically trained to effectively and efficiently manage projects. The task of managing projects has its own body of knowledge. This program seeks to provide the practical and theoretical knowledge for which the Project Management Institute tests, and it is expected that individuals who successfully complete this program will be capable of fulfilling the education requirements of the Project Management Professional (PMP) certification exam.

This certificate program in project management is designed with sufficient course flexibility to accommodate professionals with various levels of project management experience. Project management principles are applicable to both manufacturing and service industries, including professionals in fields such as software engineering, construction management, and financial services.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
PJM 5900	Foundations of Project Management <sup>1</sup>	4
PJM 6005	Project Scope Management	3
PJM 6015	Project Risk Management	3
PJM 6025	Project Scheduling and Cost Planning	3

<sup>1</sup> Foundations of Project Management (PJM 5900) is for students with fewer than three years of experience directing or leading project tasks. Students who do not complete PJM 5900 may substitute project management electives to satisfy the required program hours.

### Elective Courses

Code	Title	Hours
Choose from the following:		
INT 6940	Experiential Learning Projects for Professionals	3
INT 6943	Integrative Experiential Learning	
PJM 6075	Project Finance	
PJM 6125	Project Evaluation and Assessment	
PJM 6140	Managing Troubled Projects	
PJM 6145	Global Project Management	
PJM 6175	Project Resource Management	
PJM 6180	Project Stakeholder Management	
PJM 6205	Leading and Managing Technical Projects	
PJM 6210	Communication Skills for Project Managers	
PJM 6215	Leading Remote Project Teams	

PJM 6710	Introduction to Program and Portfolio Management
PJM 6983	Topics

## Program Credit/GPA Requirements

16 quarter hours required  
Minimum 3.000 GPA required

### Public and Media Relations, Graduate Certificate

There is growing demand for communication professionals with digital media skills and a strategic perspective on brand and reputation management. According to the Bureau of Labor Statistics, employment of public relations specialists and managers will grow by 12 percent and 13 percent, respectively. The Graduate Certificate in Public and Media Relations is designed to prepare communication professionals who focus on external stakeholders for the challenges of a rapidly changing industry. This program focuses on developing strategic communication plans, crafting compelling messages, and performing audience research, while preparing students with the latest skills in digital platforms, tools, and techniques.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
PBR 6100	Introduction to Public Relations	3
PBR 6135	Public Relations Strategy and Planning	3
PBR 6710	Public Relations Research: Understanding External Audiences	3

## Elective Courses

Code	Title	Hours
Complete 7 quarter hours from the following:		7
CMN 6025	Digital Era Skills: Platforms, Tools, and Techniques	
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	
CMN 6050	Crisis Communication	
CMN 6075	Digital Marketing Analytics	
DGM 6290	Social Media and Brand Strategy Implementation	
DGM 6550	Search Engine Optimization: Strategy and Implementation	
PBR 6001	Communications Technology Lab	
PBR 6125	Community Relations and Corporate Social Responsibility	
PBR 6130	Public Relations Content Development	
PBR 6140	Advanced Public Relations Content Development	

## Program Credit/GPA Requirements

16 total quarter hours required  
Minimum 3.000 GPA required

### Quality Assurance Compliance, Graduate Certificate

Global regulatory requirements and compliance standards for development, marketing approval, and clinical utilization of new biomedical products continue to evolve rapidly in today's dynamic healthcare environment. The professional practice of quality assurance involves ensuring compliance to appropriate industry-specific regulatory standards throughout a biomedical product's life cycle.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
Complete one of the following:		
RGA 6000	Introduction to Food and Drug Administration (FDA) Pharmaceutical Regulation	2
RGA 6001	Introduction to Food and Drug Administration (FDA) Medical Device Regulation	
RGA 6461	Cybersecurity and Regulation of Digital Health Technologies by the FDA	
Complete the following courses:		
RGA 6233	Application of Quality System Regulation in Medical Device Design and Manufacturing	4
RGA 6234	Risk Management: Compliance and Processes	4
RGA 6275	Product Development and Process Validation	2
Choose from the following to reach 16 quarter hours:		
RGA 6221	European Union Compliance Process and Regulatory Affairs	
RGA 6410	Fundamentals of CMC Regulations and Methods	
RFA 6220	Food Safety and Surveillance: Concepts and Applications	

### Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

### Remote Sensing, Graduate Certificate

Remote sensing is the measurement of information by a recording device that is not in physical contact with the object being measured. In practice, remote sensing is the utilization at a distance (as from aircraft, space shuttle, spacecraft, satellite, or ship) of any device for gathering information about the environment. The term remote sensing is most often applied to terrestrial and weather observations but can be applied to planetary environments and astronomy. Remote sensing is applicable to many other situations, including land-use change, pollution tracking, land-use and planning, transportation systems, and military observation.

The online Graduate Certificate in Remote Sensing aims to make education and training in remote sensing available to adult and professional students. The remote sensing certificate program seeks to produce students who are well versed in remote sensing theory, who have hands-on exposure to remote sensing software and hardware, and who have learned how to extract pertinent data from remotely sensed data sets. This six-course certificate program seeks to provide students with the necessary skills and understanding to apply remote sensing knowledge competently and effectively in a variety of areas.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Courses

Code	Title	Hours
RMS 5105	Fundamentals of Remote Sensing	3
RMS 6110	Introduction to Machine Learning for Image Data	3

## Remote Sensing Electives

Code	Title	Hours
Complete four of the following:		
GIS 6345	Geospatial Programming	
ITC 6480	Amazon Web Service (AWS) Cloud Architecting	
RMS 6240	Introduction to Radar and LiDAR Remote Sensing	
RMS 6280	Automated Feature Extraction for the Geospatial Professional	
RMS 6290	Spectroscopic Image Analysis	
RMS 6983	Topics	

## Program Credit/GPA Requirements

18 total quarter hours required

Minimum 3.000 GPA required

### Social Media for Organizational Performance, Graduate Certificate

In organizations, social media management and strategy development have become core skills required for communication professionals. According to WANTED Analytics, over 1.6 million working professionals utilize social media skills in jobs at the manager and executive level. The Graduate Certificate in Social Media for Organizational Performance focuses on strategic framework and the role digital media has in supporting organizational performance. The program integrates theory and practice, including experimenting with various tools and platforms and reflecting on lessons learned from active management and experimentation.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
CMN 6045	Leveraging Digital Technologies: Strategy, Assessment, and Governance	3
DGM 6285	Interactive Marketing Fundamentals <sup>1</sup>	4
DGM 6290	Social Media and Brand Strategy Implementation	4

## Electives

Code	Title	Hours
Complete a minimum of five quarter hours from the following:		
CMN 6040	Consumer Behaviors in the Online Environment	
CMN 6065	Implementation and Management of Social Media Channels and Online Communities	
CMN 6075	Digital Marketing Analytics	
CMN 6096	Cultural Communications Lab	
DGM 6168	Usability and Human Interaction	
DGM 6550	Search Engine Optimization: Strategy and Implementation <sup>2</sup>	
PBR 6001	Communications Technology Lab	

## Program Credit/GPA Requirements

16 total quarter hours required

Minimum 3.000 GPA required

<sup>1</sup> Interactive Marketing Fundamentals (DGM 6285) is for students who do not have digital media marketing experience. Students who do not complete this course take additional elective credits to satisfy the required credits for the program. Students may also meet the requirement

- through prior learning assessment. Visit the Credit for Prior Learning (<https://cps.northeastern.edu/academics/prior-learning-assessments/>) page for more information.
- <sup>2</sup> Contact your advisor to enroll in this course. Students who choose Search Engine Optimization: Strategy and Implementation (DGM 6550) are not required to complete its course prerequisites.

## Usability, Graduate Certificate

The Graduate Certificate in Usability is a practical, in-demand, career-focused graduate certificate. The certificate stresses both a broad, theory-based introduction to the field, as well as the ability to choose from focused electives, with an emphasis on practical assignments. This certificate highlights the key skills and tools used by usability generalists, working in a broad variety of fields.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

#### Required Courses

Code	Title	Hours
DGM 6168	Usability and Human Interaction	4
DGM 6268	Usable Design for Mobile Digital Media	4
DGM 6461	Interactive Information Design 1	4
DGM 6525	Research Methods for Global User Experiences	4

#### Electives Courses

Code	Title	Hours
Complete 4 quarter hours from the following:		
DGM 6308	Intermediate Programming for Digital Media	4
DGM 6451	Web Development	4
TCC 6110	Information Architecture	4

#### Program Credit/GPA Requirements

20 total quarter hours required

Minimum 3.000 GPA required

## College of Science

Website (<https://cos.northeastern.edu/admissions/graduate-programs/>)

**Hazel Sive, PhD**, Dean

**Brent Nelson, PhD**, Senior Associate Dean, Academic Affairs

**Sanjeev Mukerjee, PhD**, Senior Associate Dean for the Global University

**Carla Mattos, PhD**, Associate Dean, PhD Programs and Graduate Affairs

**Jeff Agar, PhD**, Associate Dean of MS Education and Lifelong Learning

**Erin Cram, PhD**, Associate Dean, Research

**Darien Wood, PhD**, Associate Dean, Faculty Affairs

**Randall Hughes, PhD**, Associate Dean, Equity

**Sam Inman, MBA**, Associate Dean, Administration and Finance

**Rachelle Reisberg, MS**, Assistant Dean, Undergraduate Curriculum and Students

**Tracy Tan, MS**, Assistant Dean, Professional Programs

617.373.5085

617.373.8583 (fax)

[cos@northeastern.edu](mailto:cos@northeastern.edu)

Graduate Student Services  
617.373.4275  
COSGradStudents@northeastern.edu

The College of Science seeks to offer advanced students outstanding academics and real-world research experience through cutting-edge research opportunities that are both discipline based and interdisciplinary. Our doctoral and master's degree programs in the physical sciences, life sciences, and mathematics seek to give students a deep understanding of emerging fields such as chemical biology, cognition and neuroscience, environmental and marine science, biochemistry, bioinformatics, biotechnology, nanoscience, and network science. Our programs are positioned at the forefront of discovery, invention, and innovation. We seek to prepare students and professionals to enter the scientific workforce serving the academic, government, or private sector.

## Academic Policies and Procedures

- Academic Appeals Policies (p. 929)
- Awards (p. 931)
- Changes in Requirements (p. 931)
- Cooperative Education Policies (p. 932)
- Course Registration (p. 933)
- The Doctor of Philosophy Degree (PhD) (p. 933)
- Grading Policies (p. 934)
- The Master's Degree Academic Requirements (p. 934)
- Satisfactory Progress (p. 935)
- Time Limitation (p. 935)
- Transfer Credit (p. 191)

## Academic Appeals Policies

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in the Graduate Catalog. (p. 185)

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (<https://www.northeastern.edu/ouec/about/>) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the Office for University Equity and Compliance (<https://www.northeastern.edu/ouec/about/>) is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance (<https://www.northeastern.edu/ouec/about/>). Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

Before invoking the appeals procedures, students are encouraged to speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Science process is described in the appeals section that follows. The Graduate Curriculum Committee, which is comprised of program and department directors, serves as the Academic Appeals Committee for the College of Science.

### Grade Appeals

If a graduate student wishes to dispute a grade in a course taught by a member of the College of Science faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve their issues with the faculty member who taught the course, the student should work with the department/program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean who oversees the graduate program who will attempt to resolve the issue by working with the instructor and the department/program. Contact Graduate Student Services at COSGradStudents@northeastern.edu to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the Graduate Curriculum Committee.

The decision to convene the Graduate Curriculum Committee will be based upon the following:

- The student sincerely attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.

- The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
- If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of degree conferral date.

If the associate dean determines the appeal should be brought to the Graduate Curriculum Committee, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
  - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
  - Information about the statement can be found under Step 2 Prepare an Appeal Statement—Academic Appeals Policies and Procedures I (<https://catalog.northeastern.edu/graduate/academic-policies-procedures/appeals/#text>)*Northeastern University Academic Catalog*.
- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the department/program director and convene a meeting of the Graduate Curriculum Committee.
- If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

#### **GRADUATE CURRICULUM COMMITTEE**

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student for one of the following reasons, concern that:
  - The course grading policy was not applied consistently to all students within a class and/or section.
  - The instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
  - The instructor failed to provide a clear policy on how grades would be assigned.

#### **APPEALS MEETING**

The student and the faculty member have the right to attend and present their case orally to the committee. The faculty member and the student are not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. The committee may then ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents their case, which is followed by questions from the committee. After both the complainant and faculty member have addressed the committee, the committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the committee within one week of the meeting. If the requested information is not provided in the required time frame, then the committee may weigh this failure in making its final determination regarding the original complaint.

#### **COMMITTEE PROCESS**

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the committee decides that the grading process was unfair, the committee can request that the instructor changes the student's grade.
  - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Office of the University Registrar in a timely manner following notification of the committee's decision.
- The student shall be notified within three business days of a decision being reached.

If the student or the faculty member is not satisfied with the committee's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, they may further pursue the matter by requesting in writing that the university convene an academic appeals resolution committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

#### **Academic Dismissal Appeal**

If a student wishes to dispute an academic dismissal, the first step is to consult the graduate director about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean for graduate affairs and professional programs who will attempt to resolve the issue by working with the department/program. Contact Graduate Student Services to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the Graduate Curriculum Committee.

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 10 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a meeting of the Graduate Curriculum Committee. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level.

The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

#### **GRADUATE CURRICULUM COMMITTEE**

- The Graduate Curriculum Committee serves as the Academic Appeals Committee for the College of Science.
- The Graduate Curriculum Committee is convened in order to determine whether a fair and due process was used.

#### **APPEALS MEETING**

The student has the right to attend and present their case orally to the committee. The student is not required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the committee may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the committee first. The committee may then ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The committee then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the committee believes it cannot resolve any issues without additional information, the committee may request any information needed from either the complainant or department/program. This information must be provided to the committee within one week of the meeting. If the needed information is not provided in the time frame required, then the committee may weigh this failure in making its final determination regarding the original complaint.

#### **COMMITTEE PROCESS**

- All decisions of the committee will be made based on a simple majority (51%) vote.
- The associate dean is chair of the committee and only votes when there is a tie.
- The student bringing the complaint to the committee carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the committee decides that the academic dismissal should be revoked, the committee can request that the department reinstate the student immediately.

Decisions concerning dismissals cannot be appealed beyond the college level. While program dismissals cannot be appealed beyond the college level, underlying academic judgments that led to a dismissal can be appealed.

#### **Awards**

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the College of Science via email. Pay attention to this letter as it is an official contract that should be read carefully. In addition, to maintain awards, students must be making satisfactory progress toward their degrees.

Receipt of financial support administered by the College of Science is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The College of Science requires that all students receiving awards will generally have two semesters to reach a 3.000 grade-point average. Students whose cumulative GPA is below 3.000 will be reviewed by their departments and by the College of Science and may have their funding terminated on recommendation of their department or by decision of the College of Science in consultation with their department. Renewals of awards will depend on the student making satisfactory academic progress toward the degree, including a GPA of 3.000 or the department's minimum GPA, if it is higher than the College of Science minimum, and satisfactory performance of any duties required by the award.

#### **Changes in Requirements**

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to follow the new curriculum/program, they may request this in writing to the College of Science Graduate Student Services office at the time of the announcement of said changes.

## Cooperative Education Policies

The College of Science Graduate Cooperative Education Program is one option for experiential learning and is available to students enrolled full-time at Northeastern University in a degree-granting program.

The goals of cooperative education are for students to:

- **Integrate knowledge** and skills learned in the classroom and co-op to identify and solve problems
- **Gain new knowledge** and develop new skills to successfully engage in unfamiliar activities and projects
- **Identify and leverage opportunities** to learn beyond the classroom
- **Articulate** the intellectual skills that underlie the work they engage in
- **Assess, critique, and improve** their work
- **Adapt** their behavior to different audiences they interact with (e.g., communication, self-representation, etc.)
- **Behave professionally** in various environments (i.e., team, independent, etc.) by adhering to ethical standards and being accountable for their commitments

### ELIGIBILITY REQUIREMENT FOR CO-OP

Master's-level students must meet the eligibility requirements and follow the guidelines below. Co-op is not guaranteed, and it is strongly recommended that students conduct independent searches as well.

- To be eligible for co-op, College of Science graduate students must:
  - Be enrolled full time at Northeastern. For students enrolled part time, meet with your co-op advisor to discuss options.
  - Have completed a minimum of 16 master's-level academic credits prior to the start of co-op.
  - Meet the 3.000 minimum grade-point average requirement.
  - Have no incomplete grades, not be on academic probation, or have any outstanding disciplinary issues.
  - Depending on your program and campus, returning to courses after your co-op experience may be required. See your co-op and academic advisor for clarification.
- Graduate certificate students are not eligible for co-op.
- International students on an F-1 visa must have a valid I-20 and must follow Curricular Practical Training protocol.
- Students must successfully complete the Professional Development for Co-op course. This course covers the College of Science co-op performance standards, which encourage professional and ethical behaviors throughout the co-op process and clarify procedures required for continued success of students and the co-op program. The standards establish professional expectations of the student throughout the co-op search process and during the co-op term and address co-op related issues that may involve performance.
- Students must notify their co-op advisor when they receive a co-op offer.

### GUIDELINES

1. Co-ops must be aligned with academic terms (fall, spring, and full summer or summer 1 and summer 2).
2. Students may participate in co-op activities with a single company for four or six months for no fewer than 12 weeks and must align with the academic calendar.
3. Co-ops are required to be full time, a minimum of 32 hours per week.
4. Course enrollment while on co-op is dependent upon academic program.
5. Students can create their own co-op outside of NUworks. Approval from the co-op faculty and adherence to all guidelines are required.
6. Students working in industry must complete an industry project to fulfill the co-op requirement. This must be approved by your assigned co-op faculty/coordinator.
7. College of Science students are only allowed to complete one co-op work experience per degree.

### REGISTERING FOR CO-OP

Students are registered for the co-op work experience course based on the co-op position in NUworks. All co-op positions must be aligned with the academic calendar and be approved by the co-op faculty.

### CO-OP DOCUMENTATION

Students who fully and successfully participate in co-op will receive a grade of Satisfactory (S). Those who fail to complete their co-op assignment will receive a grade of Unsatisfactory (U). These grades will appear on the student's academic transcript. Academic credit is not awarded for the completed co-op.

### GLOBAL UNIVERSITY SYSTEM

University and college cooperative education policies apply to students on all campuses.

**THE COLLEGE OF SCIENCE CO-OP STANDING COMMITTEE**

In the event a situation arises that requires special consideration, the College of Science students who are dismissed from or resign from a co-op job will have an opportunity to meet with the co-op standing committee for a review. A decision will be made on future co-op eligibility and access to NUworks.

**PHD STUDENTS**

Please contact your department or Graduate Student Services to inquire about guidelines for experiential learning opportunities.

**Course Registration**

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients, and some departments require it for all students. Students should check with individual departments for specific guidelines.

**The Doctor of Philosophy Degree (PhD)**

The Doctor of Philosophy degree is awarded to candidates who provide evidence of high scholastic attainment and research ability in their major field. Specific degree requirements are administered by a committee in charge of the degree program. It is the responsibility of the chair of this committee to certify to the College of Science the completion of each requirement for each candidate.

**Residence Requirement**

A PhD student must spend the equivalent of at least one academic year in residence at Northeastern University as a full-time graduate student. The committee of each degree program specifies the method by which the residence requirement is satisfied.

**Qualifying Exam**

In programs where a qualifying exam is required, students must complete this requirement within the time limit set by the program of study.

**Comprehensive Examination**

Degree programs may require a comprehensive examination. Generally, students are expected to complete all of the required degree coursework prior to taking the comprehensive examination. Students must complete this requirement within the time limit set by the program of study, usually within one term of completing the required coursework.

**Doctoral Degree Candidacy**

PhD degree candidacy is established when students have completed all departmental and university requirements for candidacy. These requirements vary by department and include completing the minimum number of graduate semester hours required of doctoral students by the department (this may include an earned master's degree accepted by the department) and passing a qualifying examination and/or a comprehensive examination. Once students reach doctoral degree candidacy they will be certified, in writing, by the college. Registration in coursework is not permitted once a student reaches candidacy.

**Continuity of Registration**

For each of the first two semesters that a doctoral candidate has established candidacy, the student must register for Dissertation. For each semester beyond the two Dissertation registrations, the student must register for Doctoral Dissertation Continuation until the dissertation is approved by the College of Science. During the terms when a student is registered for Doctoral Dissertation or Dissertation Continuation, coursework is not permitted as the course requirements for the degree have already been met. If the academic program requires enrollment in seminars or courses in addition to Dissertation or Dissertation Continuation, the department's graduate director will make a recommendation to the College of Science for approval. Approval must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern for a period of one year may be required to apply for readmission. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Slate. A student who does not enroll for a period of two semesters, or less than one year, may petition their department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

**Dissertation**

The dissertation committee shall have at least three faculty members, two of whom shall be from Northeastern. The chair of the dissertation committee (who is presumed to be the thesis advisor) will be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold a PhD (or other research doctorate) or an appropriate terminal degree for the discipline. Exceptions to this policy will be considered and, if appropriate, approved by the provost or their designee. Colleges may permit full-time faculty from other ranks to serve in this role based on the research qualifications and experience of individual faculty members.

The PhD committee should be appointed early enough to advise in the formulation of the student's program and in refining the research topic for the dissertation. Within the constraints of the above criteria, the PhD program faculty will determine the process by which dissertation committees

are established. The final list of dissertation committee members shall be reported to the college's associate dean for graduate education or unit managing the degree program.

If a student's major advisor leaves Northeastern (including transition to emeritus status), that person may continue the research direction of the dissertation or thesis. However, a co-advisor must be appointed from the academic department or program. The student will then have two advisors, one an official member of the Northeastern faculty who will be available for research and administrative matters and the ex-Northeastern advisor. If a new major advisor is appointed, the former Northeastern faculty member may serve as an outside member of the committee.

## Final Oral Examination

An oral defense of the dissertation is required and must be held at least 14 calendar days before the degree conferral date. The defense shall be conducted with the committee members present either in person or via electronic means. In the case where neither the candidate nor the committee members are present in person on campus (i.e., the candidate and all committee members are connected only remotely via electronic means), there shall be a location established and technology enabled for public, in-person attendance of the defense by the university community and this accommodation made known to the university.

## Interdisciplinary Doctoral Programs

Some graduate students may wish to pursue doctoral programs that involve substantial work in two or more departments. To meet this need, an interdisciplinary program may be established that corresponds in scope and depth to doctoral standards but does not agree exactly with the individual departmental regulations. Consult this graduate catalog for policies and guidelines pertaining to this doctoral option.

## Grading Policies

In the College of Science, not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average.

No grade changes (p. 176) are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted unless the student is immediately continuing on for a PhD degree in their department.

Students cannot elect a pass/fail grading scheme for College of Science courses, unless the course grading scheme is designated pass/fail.

## The Master's Degree Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and such other study as may be required by the department in which the student is registered.

To qualify for the degree, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester according to the university grading system and will exclude any transfer credits and nonrepeatable courses that have been retaken. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be terminated from the program.

## Comprehensive Examination

A final written or oral comprehensive examination is required in some programs. This examination will be given by the department concerned at least two weeks before the commencement at which the degree is expected to be conferred.

## Thesis

A master's thesis is required in some programs and should demonstrate the individual's capacity to execute independent work based on original material. Registration for Thesis is required in most programs.

Theses must be approved by the departmental graduate committee and, in cases in which a grade is required, must receive a grade of B (3.000) or better to be accepted.

## Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. A student who does not enroll for a period of three semesters, or one year, will be required to apply for readmission. Readmission is done via Slate. A student who does not enroll for a period of two semesters, or less than one year, may petition their department for reactivation. If the department is supportive, the student will be required to submit a written request to the departmental graduate committee. If the graduate committee feels the student is worthy of reactivation, the student's written request must be submitted to Graduate Student Services. Please note that college admissions deadlines apply to requests for readmission and reactivation.

## Satisfactory Progress

Satisfactory progress means satisfying requirements in the College of Science, in this graduate catalog, and in the regulations specified by the departments.

The College of Science sets minimum standards for all students to fulfill. Departments and programs may have additional requirements that exceed those of the College of Science. Students in the College of Science must be making satisfactory progress, including working toward the graduation requirement of a grade-point average of 3.000 in their coursework and the timely completion of coursework and comprehensive/qualifying examinations. See also the university's policy on academic standing ("Minimum Cumulative GPA (p. 190)").

## Time Limitation

Refer to Northeastern University policy regarding time limitations. If students wish to apply for an extension of the time limit, they must submit a petition to their department of study. The petition must include a detailed plan for completion of all remaining degree requirements. In the case of master's degree time limit extension requests for coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend a time limit extension to Graduate Student Services. The associate dean has final approval of time limit extensions.

## Biology

Website (<https://cos.northeastern.edu/biology/>)

### James Monaghan, PhD

Professor and Chair

134 Mugar Life Sciences Building

617.373.6539

617.373.3724 (fax)

[gradbio@northeastern.edu](mailto:gradbio@northeastern.edu)

The PhD program in biology emphasizes close interaction between graduate students and faculty in developing the intellectual and experimental skills required for creative independent research. Rigorous courses in a core biology curriculum, as well as advanced courses in particular research interests, are complemented by intensive research culminating in completion of a dissertation under faculty supervision. Students have an opportunity to declare a concentration in either cell and molecular biology or molecular microbiology.

The Department of Biology oversees the bioinformatics Master of Science program. The interdisciplinary program provides cross-disciplinary training in biology, computer science, and informational technology, preparing students for cutting-edge jobs in the biotechnology and pharmaceutical industries. The program consists of four parts: fundamental courses, core courses, co-op and experiential learning, and electives.

The Graduate Certificate in Bioinformatics offers professionals working in the research, healthcare, and pharmaceutical industries the ability to employ bioinformatics algorithms and techniques to biological problems in their current practice. It also gives people looking to switch careers the data and genomic analysis skills needed to be more competitive in the biological and pharmaceutical industries.

The Graduate Certificate in Omics provides students the opportunity to explore in detail the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment, learning how scientists sequence, assemble, and analyze the function and structure of genomes. The certificate explores methods for determining traits and diseases by studying the larger population as well as how gene identification can help identify targets for therapeutic intervention. Students that are already in the field or have an interest will significantly benefit from a certificate like this.

## Programs

### Doctor of Philosophy (PhD)

- Biology (p. 936)

### Master of Science (MS)

- Bioinformatics (p. 938)
- Cell and Gene Therapies (p. 941)

### Graduate Certificate

- Bioinformatics (p. 942)
- Omics (p. 944)

## Biology, PhD

The PhD program entails course work from a core biology curriculum along with advanced courses in the student's area of research interest. This is complemented by intensive research and completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Two optional concentrations are available: cell and molecular biology and molecular microbiology.

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*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an (p. 1103)MS Biology (<https://catalog.northeastern.edu/graduate/science/biology/biology-ms/>) degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Biology (<https://catalog.northeastern.edu/graduate/science/biology/biology-ms/>) degree. Note that no students will be admitted directly into the MS Biology (<https://catalog.northeastern.edu/graduate/science/biology/biology-ms/>) to pursue a master's degree.*

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination  
Annual review  
Dissertation committee  
Dissertation proposal  
Colloquia (minimum of three)  
First-author publication  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Research Ethics</b>		
BIOL 7399	Research Problem Solving, Ethics, and Communication Skills	4
<b>Colloquium</b>		
Complete the following (repeatable) course twice:		
BIOL 5100	Biology Colloquium	2

### Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Cell and Molecular Biology Concentration (p. 937)
- Molecular Microbiology Concentration (p. 937)
- Electives (p. 937)

### Dissertation

Code	Title	Hours
BIOL 9990	Dissertation Term 1	
BIOL 9991	Dissertation Term 2	

### Program Credit/GPA Requirements

30 total semester hours required  
Minimum 3.000 GPA required

**CELL AND MOLECULAR BIOLOGY CONCENTRATION**

Code	Title	Hours
<b>Required Coursework</b>		
BIOL 6300	Biochemistry	4
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	4
<b>Electives</b>		
In consultation with faculty advisor, complete 16 semester hours from the topic of cell and molecular biology:		16
BIOL 5103 to BIOL 9984		

**MOLECULAR MICROBIOLOGY CONCENTRATION**

Code	Title	Hours
<b>Required Coursework</b>		
BIOL 6300	Biochemistry	4
BIOL 6405	Prokaryotic Cell and Molecular Biology	4
<b>Electives</b>		
In consultation with faculty advisor, complete 16 semester hours from the topic of molecular microbiology:		16
BIOL 5103 to BIOL 9984		

**ELECTIVES OPTION**

Code	Title	Hours
<b>Required Coursework</b>		
Complete 8 semester hours from the following:		8
BIOL 6303	Neurobiology and Behavior	
BIOL 6401	Research Methods and Critical Analysis in Molecular Cell Biology	
BIOL 6405	Prokaryotic Cell and Molecular Biology	
<b>Electives</b>		
Complete 16 semester hours from the following:		16
BIOL 5103 to BIOL 9984		

**Advanced Entry Program Requirements**

The biology PhD program seeks to provide a broad background knowledge base in conjunction with in-depth study of a specialized area of biology. The program emphasizes close interaction between graduate students and faculty members in developing the intellectual and experimental skills required for creative, independent research.

Students entering the PhD program with a related Master of Science degree typically have significantly reduced course loads. An individualized course of study is designed by the biology graduate curriculum committee in consultation with the student and the student's advisor. The student can then focus on intensive research and completion of a dissertation under faculty supervision. Faculty research includes biochemistry, microbiology, cell and molecular biology, genetics, neurobiology, regenerative biology, and the biology of reproduction. Financial support (teaching assistantships or research assistantships) is normally provided for PhD students who are making satisfactory progress toward completion of their degree.

Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

- Qualifying examination
- Annual review
- Dissertation committee
- Dissertation proposal
- Colloquia (minimum of three)
- First-author publication
- Dissertation defense

**Core Requirements****APPROVED COURSE WORK**

Consult your faculty advisor for acceptable courses.

**APPROVED ELECTIVES**

Consult your faculty advisor for acceptable electives.

## Dissertation

Code	Title	Hours
BIOL 9990	Dissertation Term 1	
BIOL 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

Variable total semester hours required

Minimum 3.000 GPA required

## Bioinformatics, MS

The Master of Science (MS) in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Upon completion, students are equipped to apply bioinformatics and computational methods to biological problems. Students in the MS program have the opportunity to gain professional work experience via co-op.

The program consists of core course work in computational methods, programming, and statistics, enhanced by electives in molecular biology, biochemistry, molecular modeling, web development, database design and management, data mining, and other related topics.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Computational Methods</b>		
BINF 6310	Introduction to Computational Methods in Bioinformatics	4
<b>Research and Seminar</b>		
BIOL 6381	Ethics in Biological Research	2
BIOT 5219	The Biotechnology Enterprise	2
<b>Statistics and Programming</b>		
BINF 6200	Bioinformatics Programming	4
MATH 7340	Statistics for Bioinformatics	4
<b>Elective</b>		
Complete one 4 semester hours elective		4
<b>Co-op and Experiential Learning</b>		
BINF 6500	Professional Development for Co-op	0
Select one of the following:		
BINF 5964	Projects for Professionals <sup>1</sup>	
BINF 6964	Co-op Work Experience	

<sup>1</sup> The option of BINF 5964 Projects for Professionals is not available at all campus locations. Please refer to your advisor or admissions coach for course availability each semester at your campus location.

## Concentrations or Electives Option

A concentration is not required. Students may complete electives in lieu of a concentration.

- Bioinformatics Enterprise (p. 939)
- Biotechnology (p. 939)
- Data Analytics (p. 939)
- Health Informatics (p. 939)

- Medical Health Informatics (p. 939)
- Omics (p. 939)
- Electives (p. 939)

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### BIOINFORMATICS ENTERPRISE CONCENTRATION

Code	Title	Hours
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	3
BIOT 5400	Scientific Information Management for Biotechnology Managers	3
Elective from Elective List (p. 939)		3

### BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
BIOT 5120	Foundations in Biotechnology	3
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOL 6299	Molecular Cell Biology for Biotechnology (Electives)	3
Elective from Elective List (p. 939)		3

### DATA ANALYTICS CONCENTRATION

Code	Title	Hours
DA 5020	Collecting, Storing, and Retrieving Data	4
DA 5030	Introduction to Data Mining/Machine Learning (or Elective)	4
INSH 5302	Information Design and Visual Analytics	4

### HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
HINF 5101	Introduction to Health Informatics and Health Information Systems	3
HINF 5102	Data Management in Healthcare	3
HINF 6220	Database Design, Access, Modeling, and Security	3
Elective from Elective List (p. 939)		3

### MEDICAL HEALTH INFORMATICS CONCENTRATION

Code	Title	Hours
HINF 5105	The American Healthcare System	3
HINF 5110	Global Health Information Management	3
HINF 5200	Theoretical Foundations in Personal Health Informatics	4
Elective from Elective List (p. 939)		2

### OMICS CONCENTRATION

Code	Title	Hours
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
Elective from Elective List (p. 939)		4

### ELECTIVES OPTION

Code	Title	Hours
Complete 12 semester hours from the approved Elective List. (p. 939)		12

### ELECTIVE LIST

Code	Title	Hours
Electives outside this list may be chosen in consultation with faculty advisor:		
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	

BIOE 5235	Biomedical Imaging
BIOE 5410	Molecular Bioengineering
BIOE 5420	Cellular Engineering
BIOE 6100	Medical Physiology
BIOL 5100	Biology Colloquium
BIOL 5543	Stem Cells and Regeneration
BIOL 5549	Inventions in Microbial Biotechnology
BIOL 5573	Medical Microbiology
BIOL 5581	Biological Imaging
BIOL 5583	Immunology
BIOL 5585	Evolution
BIOL 5587	Comparative Neurobiology
BIOL 5591	Advanced Genomics
BIOL 5593	Cell and Molecular Biology of Aging
BIOL 5597	Immunotherapies of Cancer and Infectious Disease
BIOL 6299	Molecular Cell Biology for Biotechnology
BIOL 6300	Biochemistry
BIOL 6301	Molecular Cell Biology
BIOT 5120	Foundations in Biotechnology
BIOT 5145	Biotechnology Lab Skills
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5500	Concepts in Regulatory Science
BIOT 5560	Bioprocess Fundamentals
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5820	Cellular Therapies
BIOT 5850	Higher-Order Structure Analytics
BIOT 6214	Experimental Design and Biostatistics
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 7245	Biotechnology Applications Laboratory
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5620	Protein Chemistry
CHEM 5638	Molecular Modeling
CS 5010	Programming Design Paradigm
CS 5100	Foundations of Artificial Intelligence
CS 5200	Database Management Systems
CS 5400	Principles of Programming Language
CS 5500	Foundations of Software Engineering
CS 5600	Computer Systems
CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning

DS 5230	Unsupervised Machine Learning and Data Mining
EEMB 5130	Population Dynamics
HINF 5101	Introduction to Health Informatics and Health Information Systems
HINF 5102	Data Management in Healthcare
HINF 5105	The American Healthcare System
HINF 5110	Global Health Information Management
HINF 5200	Theoretical Foundations in Personal Health Informatics
HINF 6220	Database Design, Access, Modeling, and Security
HINF 6404	Patient Engagement Informatics and Analytics
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7243	Machine Learning and Statistical Learning Theory 1
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
PHSC 6290	Biophysical Methods in Drug Discovery
PHSC 6300	Pharmaceutical Science Seminar
PHYS 5116	Network Science 1
PT 5410	Functional Human Neuroanatomy
PT 5411	Lab for PT 5410

## Cell and Gene Therapies, MS

Northeastern University's Master of Science in Cell and Gene Therapies is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in advanced therapies, such as cell therapies and gene therapies, with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research, managerial, or technical professionals in a wide range of the cell and gene therapies fields.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

Code	Title	Hours
<b>Required Core</b>		
BINF 6200	Bioinformatics Programming	4
BIOL 5543	Stem Cells and Regeneration	4
BIOL 5583	Immunology	4
BIOL 5821	Cell and Gene Therapies	4
BIOL 6381	Ethics in Biological Research	2
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 5830	Regulatory Landscape of Cell and Gene Therapies	2
BIOT 5840	Cell and Gene Therapy Lab	3
PMST 6254	Advanced Drug Delivery Systems	3

**Co-op**

BIOT 6500	Professional Development for Co-op	0
BIOT 6964	Co-op Work Experience	0

**Elective**

Complete a minimum of 3 semester hours from the following to meet the 32 total hours for the program: 3

BINF 6308	Bioinformatics Computational Methods 1
BIOE 5430	Principles and Applications of Tissue Engineering
BIOE 6000	Principles of Bioengineering
BIOL 5549	Inventions in Microbial Biotechnology
BIOL 5573	Medical Microbiology
BIOL 5581	Biological Imaging
BIOL 5587	Comparative Neurobiology
BIOL 5591	Advanced Genomics
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5330	Drug Safety and Immunogenicity
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5500	Concepts in Regulatory Science
BIOT 5560	Bioprocess Fundamentals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5850	Higher-Order Structure Analytics
BIOT 6300	Pharmaceutical Microbiology
BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
CHME 5101	Fundamentals of Chemical Engineering Analysis
CHME 5160	Drug Delivery: Engineering Analysis
CHME 5185	Design of Experiments and Ethical Research (DOEER)
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5632	Advanced Topics in Biomaterials

**Program Credit/GPA Requirements**

32 semester hours required

Minimum 3.000 GPA required

**Bioinformatics, Graduate Certificate**

The Graduate Certificate in Bioinformatics seeks to provide students with core knowledge in bioinformatics programming, integrating knowledge from the biological, computational, and mathematical disciplines. Students gain the data and genomic analysis skills needed to employ bioinformatics techniques to biological problems. The graduate certificate consists of four courses, three bioinformatics courses and one elective, totaling 15–16 semester hours.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BINF 6200	Bioinformatics Programming	4
BINF 6308	Bioinformatics Computational Methods 1	4
BINF 6309	Bioinformatics Computational Methods 2	4

## Elective

Code	Title	Hours
Complete one of the following. Electives outside this list may be chosen in consultation with faculty advisor.		3-4
BINF 6400	Genomics in Bioinformatics	
BINF 6420	Omics in Bioinformatics	
BIOE 5235	Biomedical Imaging	
BIOE 5410	Molecular Bioengineering	
BIOE 5420	Cellular Engineering	
BIOE 6100	Medical Physiology	
BIOL 5543	Stem Cells and Regeneration	
BIOL 5549	Inventions in Microbial Biotechnology	
BIOL 5573	Medical Microbiology	
BIOL 5581	Biological Imaging	
BIOL 5583	Immunology	
BIOL 5585	Evolution	
BIOL 5587	Comparative Neurobiology	
BIOL 5591	Advanced Genomics	
BIOL 5593	Cell and Molecular Biology of Aging	
BIOL 5597	Immunotherapies of Cancer and Infectious Disease	
BIOL 6299	Molecular Cell Biology for Biotechnology	
BIOL 6300	Biochemistry	
BIOL 6301	Molecular Cell Biology	
BIOL 6303	Neurobiology and Behavior	
BIOT 5120	Foundations in Biotechnology	
BIOT 5145	Biotechnology Lab Skills	
BIOT 5219	The Biotechnology Enterprise	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5560	Bioprocess Fundamentals	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5635	Downstream Processes for Biopharmaceutical Production	
BIOT 5640	Drug Product Processes for Biopharmaceuticals	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
BIOT 5850	Higher-Order Structure Analytics	
BIOT 7245	Biotechnology Applications Laboratory	
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	
CHEM 5617	Protein Mass Spectrometry Laboratory	
CHEM 5620	Protein Chemistry	
CS 5010	Programming Design Paradigm	
CS 5100	Foundations of Artificial Intelligence	
CS 5200	Database Management Systems	
CS 5400	Principles of Programming Language	
CS 5500	Foundations of Software Engineering	
CS 5600	Computer Systems	

CS 5610	Web Development
CS 5700	Fundamentals of Computer Networking
CS 5800	Algorithms
CS 6140	Machine Learning
CS 6200	Information Retrieval
CS 6220	Data Mining Techniques
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
MATH 5131	Introduction to Mathematical Methods and Modeling
MATH 7203	Numerical Analysis 1
MATH 7205	Numerical Analysis 2
MATH 7233	Graph Theory
MATH 7241	Probability 1
MATH 7340	Statistics for Bioinformatics
MATH 7341	Probability 2
MATH 7342	Mathematical Statistics
MATH 7344	Regression, ANOVA, and Design
PHSC 6214	Experimental Design and Biostatistics
PHYS 5116	Network Science 1

## Program Credit/GPA Requirements

15–16 total semester hours required

Minimum 3.000 GPA required

## Omics, Graduate Certificate

Students will explore in detail the key genomic technologies and computational approaches that are driving advances in prognostics, diagnostics, and treatment, learning how scientists sequence, assemble, and analyze the function and structure of genomes. The certificate explores methods for determining traits and diseases by studying the larger population, as well as how gene identification can help identify targets for therapeutic intervention. Students that are already in the field or have an interest in the field will significantly benefit from this curriculum.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Requirements

Code	Title	Hours
<b>Required Courses</b>		
BINF 6310	Introduction to Computational Methods in Bioinformatics	4
BINF 6400	Genomics in Bioinformatics	4
BINF 6420	Omics in Bioinformatics	4
BINF 6430	Transcriptomics in Bioinformatics	4

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Chemistry and Chemical Biology

Website (<https://cos.northeastern.edu/chemistry-chemical-biology/>)

### Penny Beuning, PhD

Professor and Chair

617.373.2822

The PhD program in chemistry provides research and professional opportunities for students that are based on fundamental chemical principles with translational applications to the real world. The program is built on academic rigor and research impact, based on the creativity and strengths of an increasingly diverse faculty and student body. We have harnessed our extensive connections in industry to create and maintain a thriving industry-entry PhD program and provide our regular PhD students with internship opportunities in industry, government laboratories, and other venues that may lead to a wide range of careers. Students in our program leave with flexible skills that can be applied in creative and meaningful ways in academics, industry, and beyond. We are aligned in our core values with the mission of Northeastern University to “educate students for a life of fulfillment and accomplishments and create and translate knowledge to meet global and societal needs.” This mission is at the core of the curriculum, research, mentoring strategies, and professional development opportunities offered to our students. It is implemented in a highly multidisciplinary and transparent environment where students have a voice and take real ownership and responsibility for their professional success. Within this context, PhD students work with chemistry and chemical biology faculty in interdisciplinary areas that include biochemistry and chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, environmental chemistry, computational chemistry, and bioanalytical chemistry.

The Master of Science in Chemistry is designed to allow practicing chemical professionals who have an earned bachelor's degree in chemistry or a closely related field to pursue a master's degree in chemistry by completing a coursework program during the evening weekday hours. Full-time or part-time options are available. The department offers a diverse range of courses that mirror the faculty's research interests in biochemistry, chemical biology, synthetic chemistry, medicinal chemistry, polymer and materials chemistry, environmental chemistry, computational chemistry, and bioanalytical chemistry.

Website (<https://cos.northeastern.edu/master-of-science-in-biotechnology/>)

### Jocelyn Haversat, PhD

Associate Teaching Professor and Director, Biotechnology Programs

617.373.6998

The biotechnology programs are housed in the Department of Chemistry and Chemical Biology. The Master of Science in Biotechnology, a professional science master's degree program, is an innovative, nonthesis, experiential graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, regulatory, and pharmaceutical sciences with the development of high-value business skills critical to success in the biotechnology industry. Students develop and apply their skills in a hands-on co-op experience with one of Northeastern's many academic and industry partners. Full-time, part-time, and remote options are available with online and evening course offerings.

The biotechnology program also offers several graduate certificates in the areas of biodefense and biosecurity, biopharmaceutical analytical sciences, biotechnology, biotechnology enterprise, biotechnology regulatory science, experimental biotechnology, manufacturing and quality operations, molecular biotechnology, pharmaceutical technologies, process science, and vaccine development.

## Programs

### Doctor of Philosophy (PhD)

- Chemistry (p. 946)

### Master of Science (MS)

- Biotechnology (p. 947)
- Chemistry (p. 952)

### Graduate Certificate

- Biodefense and Biosecurity (p. 953)
- Biopharmaceutical Analytical Sciences (p. 953)
- Biotechnology (p. 954)
- Biotechnology Enterprise (p. 954)
- Biotechnology Regulatory Science (p. 955)
- Experimental Biotechnology (p. 956)
- Manufacturing and Quality Operations in Biotechnology (p. 956)
- Molecular Biotechnology (p. 957)
- Pharmaceutical Technologies (p. 957)

- Process Science (p. 958)
- Vaccine Development (p. 958)

## Chemistry, PhD

The PhD program in chemistry is designed for students who have earned a bachelor's or a master's degree in chemistry or related areas and who wish to earn a doctorate in chemistry. Research spans a wide range of multidisciplinary fields, with strengths in clean energy, polymers, materials, medicinal chemistry, bioanalytical chemistry, and chemical biology. Our research programs draw from a strong foundation in analytical, organic, physical, and biological chemistry in a collaborative and diverse environment. Our student-focused approach to mentoring, a strong graduate student association, and faculty deeply rooted both in academics and industry provide a flexible platform for student development toward a large diversity of career paths.

Students typically take courses their first year while supported on teaching assistantships and achieve PhD candidacy in the second year. The primary emphasis of the program is on the completion of an original research project, its articulation in a well-written thesis, and its subsequent defense before the thesis committee through an open seminar followed by oral examination by the committee members.

## PhD Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Three qualifying examinations

Annual review

Candidacy

Minimum of two seminars

Dissertation committee

Dissertation proposal

Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7710	Laboratory Rotations in Chemistry and Chemical Biology	0
CHEM 7750	Advanced Problem Solving	3
Complete the following (repeatable) course three times:		3
CHEM 5501	Chemical Safety in the Research Laboratory	
<b>Seminar</b>		
At least one seminar must be taken for a letter grade.		
CHEM 8504	Graduate Seminar	1
<b>Research</b>		
CHEM 8984	Research	1-6
<b>Chemistry</b>		
Complete 18 semester hours from the following:		18
CHEM 5550 or within the range of CHEM 5610 to CHEM 7320		

### Dissertation

Code	Title	Hours
Complete the following courses:		
CHEM 9990	Dissertation Term 1	
CHEM 9991	Dissertation Term 2	

Registration in the following course is required for any additional terms taken to complete the dissertation.

CHEM 9996

Dissertation Continuation

## Program Credit/GPA Requirements

32 total semester hours required  
Minimum 3.000 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Advanced entry into the PhD program requires a master's degree in chemistry or a related area. Graduate courses taken during acquisition of the Master of Science degree allow completion of the PhD program with fewer course credits. Other than the course requirements, which are specified separately, see the PhD program requirements for details.

### INDUSTRY ENTRY PHD

This program is strictly for students who already have a master's degree in chemistry or related area and have full-time employment at a company. The company must commit to all financial responsibilities accrued in obtaining the degree and allow time for the student to work on a PhD thesis in collaborative research with a company supervisor and one of our faculty members. Graduate courses in the Department of Chemistry and Chemical Biology are generally taught in the evenings to accommodate the fact that our students work in industry during the day.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Three qualifying examinations  
Annual review  
Candidacy  
Minimum of two seminars  
Dissertation committee  
Dissertation proposal  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Required Core</b>		
CHEM 5600	Research Skills and Ethics in Chemistry	3
CHEM 7750	Advanced Problem Solving	3
<b>Seminar</b>		
CHEM 8504	Graduate Seminar	1

## Dissertation

Code	Title	Hours
CHEM 9990	Dissertation Term 1	
CHEM 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

7 total semester hours required  
Minimum 3.000 GPA required

## Biotechnology, MS

### Overview

Northeastern's Master of Science in Biotechnology is a professional master's program, an innovative, nonthesis graduate degree. It combines advanced interdisciplinary training in biotechnology, biology, chemistry, and pharmaceutical sciences with the development of high-value business skills critical to success in today's dynamic workplace. This program is designed to prepare graduates to innovate, collaborate, and lead as research,

managerial, or technical professionals in a wide range of biotechnology specialties. The two-year program offers students the possibility to pursue one of ten concentrations to further their knowledge in a specific topical area of the field.

## **Concentrations**

### **AGRICULTURAL BIOTECHNOLOGY CONCENTRATION**

The agricultural concentration goes beyond the production of biological drugs and focuses on the key agricultural biotechnology (agritech) principles and methods used today. Students have an opportunity to learn the principles of agritech and the role they play in the concepts and fundamentals of agriculture today. The concentration addresses plant, animal, food, and ecological biotechnology. The learning of the students is reinforced by both lecture courses and project-driven laboratory experience that provides hands-on learning of modern agricultural methodologies.

### **BIODEFENSE CONCENTRATION**

The biodefense concentration is designed to prepare students for the initial homeland biodefense and bioterrorism response. Students have an opportunity to learn the microbiology and epidemiology of biological agents that are potential threats, identify and propose countermeasures, and develop expertise in response and recovery strategies and policies. The learning combines the foundational biotechnology courses with case-based and hands-on bioethical, biowarfare, and bioterrorism courses.

### **BIPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS CONCENTRATION**

The biopharmaceutical technologies and analytics track focuses on structures, variants and activities of biological molecules as well as how to convert purified proteins to biopharmaceutical drug products that are compatible for clinical use. Students learn the diversity of molecular forms derived from biological products, techniques to analyze and characterize these forms, and the impact of these structural changes on the safety and efficacy of biopharmaceuticals. The track addresses design of product formulation, development and implementation of drug product manufacturing processes, and relevant process technology, such as aseptic operations and freeze-drying, needed for drug product manufacturing. This is accomplished through both lecture courses and project-driven laboratory experiences that utilize analytical techniques and provide hands-on learning of formulation design and drug product process development.

### **BIOTECHNOLOGY OPERATIONS CONCENTRATION**

The biotechnology operations track is an operationally inclusive concentration that offers relevant insights to the inner workings of a biotech company while preparing students for new entry or promotions to a variety of biotech functions. Students learn the principles of quality, regulatory science, process science and manufacturing, while integrating business and management skills with the science of biotechnology. The track covers the science behind compliance and the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations, enabling students to move across positions in discovery, clinical operations, manufacturing, quality, regulatory affairs, and consulting for operations and operational strategy and/or remediations.

### **GORDON INSTITUTE OF ENGINEERING LEADERSHIP**

#### **MASTER'S DEGREE IN BIOTECHNOLOGY WITH GRADUATE CERTIFICATE IN ENGINEERING LEADERSHIP**

Students may complete a Master of Science in Biotechnology in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The certificate program requires fulfillment of the 16-semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 42-semester-hour master's degree and certificate requires 26 hours of biotechnology coursework.

## **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

## **Core Requirements**

Code	Title	Hours
<b>Required Core</b>		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5145	Biotechnology Lab Skills	1
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5401	Scientific Communication and Problem Solving in Biotechnology	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5750	Molecular Approaches in Biotechnology	3

BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245 or BIOT 7246	Biotechnology Applications Laboratory	3
	Molecular Technologies Practicum	
<b>Electives</b>		
<b>Co-op and Experiential Learning</b>		
BIOT 6500	Professional Development for Co-op	0
Select one of the following options:		3
Option 1:		
BIOT 6964	Co-op Work Experience	
Complete 3 semester hours from the Electives list. (p. 950)		
Option 2:		
BIOT 7001	Managing Innovation in Biotechnology <sup>1</sup>	

<sup>1</sup> The option of BIOT 7001 Managing Innovation in Biotechnology is not available at all campus locations. Please refer to your advisor or admissions coach for course availability each semester at your campus location.

## Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Agricultural Biotechnology (p. 949)
- Biodefense (p. 949)
- Biopharmaceutical Technologies and Analytics (p. 950)
- Biotechnology Operations (p. 950)
- Electives (p. 950)

## Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

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### AGRICULTURAL BIOTECHNOLOGY CONCENTRATION

Code	Title	Hours
<b>Required</b>		
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6100	Agricultural Biotechnology	3
<b>Elective</b>		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		
BIOT 5850	Higher-Order Structure Analytics	
BIOT 5225	Managing and Leading a Biotechnology Company	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5190	Soil Science	
ENVR 5210	Environmental Planning	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5670	Global Biogeochemistry	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	
ENVR 6150	Food Security and Sustainability	

### BIODEFENSE CONCENTRATION

Code	Title	Hours
<b>Required</b>		
BIOT 6600	Agents of Bioterrorism	3
BIOT 6610	Biosecurity and Bioterrorism	3
<b>Elective</b>		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	
PPUA 6532	Building Resilience into Local Government	

PHTH 5230	Global Health
PHTH 5202	Introduction to Epidemiology
PHTH 5212	Public Health Administration and Policy
SCHM 6223	Managing Healthcare Supply Chain Operations

**BIOPHARMACEUTICAL TECHNOLOGIES AND ANALYTICS**

Code	Title	Hours
<b>Required</b>		
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
<b>Elective</b>		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 5910	Vaccines and Immunization	3
BIOT 5930	Molecular Tools for Vaccine Design	3
BIOT 5850	Higher-Order Structure Analytics	3
BIOT 5225	Managing and Leading a Biotechnology Company	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3

**BIOTECHNOLOGY OPERATIONS**

Code	Title	Hours
<b>Required</b>		
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 6290	Foundation in Quality for Biotechnology	3
<b>Elective</b>		
In consultation with advisor, complete a minimum of 3 semester hours from the following:		
<i>Process Sciences Focus</i>		
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
<i>Manufacturing Quality Operations Focus</i>		
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6340	Sterile Manufacturing Operations	3
BIOT 5330	Drug Safety and Immunogenicity	3
<i>Regulatory Science Focus</i>		
BIOT 5340	Introduction to Biotherapeutic Approvals	3
BIOT 5500	Concepts in Regulatory Science	3
<i>Enterprise Focus</i>		
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 5228	Planning and Executing Biotechnology Projects	3

**ELECTIVES OPTION**

Code	Title	Hours
Complete 9 semester hours from the Electives list. (p. 950)		

**Electives List**

Code	Title	Hours
Complete electives from the following list and/or 1 SH BUSN graduate-level courses. Electives not on this list may be taken with academic advisor approval.		
BINF 6200	Bioinformatics Programming	3
BINF 6308	Bioinformatics Computational Methods 1	3
BIOE 5430	Principles and Applications of Tissue Engineering	3
BIOL 5543	Stem Cells and Regeneration	3
BIOL 5549	Inventions in Microbial Biotechnology	3
BIOL 5573	Medical Microbiology	3
BIOL 5581	Biological Imaging	3

BIOL 5583	Immunology
BIOL 5587	Comparative Neurobiology
BIOL 5591	Advanced Genomics
BIOL 5597	Immunotherapies of Cancer and Infectious Disease
BIOL 6381	Ethics in Biological Research
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship
BIOT 5330	Drug Safety and Immunogenicity
BIOT 5340	Introduction to Biotherapeutic Approvals
BIOT 5400	Scientific Information Management for Biotechnology Managers
BIOT 5500	Concepts in Regulatory Science
BIOT 5560	Bioprocess Fundamentals
BIOT 5635	Downstream Processes for Biopharmaceutical Production
BIOT 5640	Drug Product Processes for Biopharmaceuticals
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology
BIOT 5820	Cellular Therapies
BIOT 5850	Higher-Order Structure Analytics
BIOT 5910	Vaccines and Immunization
BIOT 5920	Foundations in Vaccine Regulatory Science
BIOT 5930	Molecular Tools for Vaccine Design
BIOT 6100	Agricultural Biotechnology
BIOT 6300	Pharmaceutical Microbiology
BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
BIOT 6600	Agents of Bioterrorism
BIOT 6610	Biosecurity and Bioterrorism
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis
CHEM 5617	Protein Mass Spectrometry Laboratory
CHEM 5621	Principles of Chemical Biology
CHEM 5625	Chemistry and Design of Protein Pharmaceuticals
CHEM 5638	Molecular Modeling
CHME 7340	Chemical Engineering Kinetics
DA 5020	Collecting, Storing, and Retrieving Data
DA 5030	Introduction to Data Mining/Machine Learning
EMGT 5220	Engineering Project Management
ENTR 6210	Managing Operations in Early Stage Ventures
ENTR 6211	Entrepreneurship: Services and Retail Business Creation
ENTR 6212	Business Planning for New Ventures
ENTR 6219	Financing Ventures from Early Stage to Exit
ENTR 6241	Entrepreneurial Marketing and Selling
ENTR 6250	Lean Design and Development
ENVR 6102	Environmental Science and Policy Seminar 2
HINF 5105	The American Healthcare System
HINF 6201	Organizational Behavior, Work Flow Design, and Change Management
INNO 6225	Acquisitions, Alliances, and Growth
INSH 5301	Introduction to Computational Statistics
INTB 6200	Managing the Global Enterprise
INTB 6212	Cultural Aspects of International Business
MGMT 6213	Managing Ethics in the Workplace and Marketplace
MGMT 6223	Strategic Decision Making for Healthcare Professionals
MGMT 6225	Sustainability and Leadership

MGSC 6200	Information Analysis
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market
NNMD 5272	Nanomedicine Seminar
NNMD 5370	Nanomedicine Research Techniques
PHSC 5212	Research Skills and Ethics
PHSC 5300	Pharmaceutical Biochemistry
PHSC 5500	Repurposing Drugs for Cancer Immunotherapies
PHSC 5560	Nanotoxicity
PHSC 6224	Behavioral Pharmacology and Drug Discovery
PHSC 6290	Biophysical Methods in Drug Discovery
PHSC 7010	Pharmaceutical Sciences Laboratory
PHTH 5320	Grant Writing in Public Health
POLS 7341	Security and Resilience Policy
POLS 7346	Resilient Cities
POLS 7343	Counterterrorism
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6532	Building Resilience into Local Government
STRT 6200	Strategic Decision Making in a Changing Environment

## Chemistry, MS

### Master's Coursework Option

The Department of Chemistry and Chemical Biology offers a full-time or part-time, course-based master's degree. Classes are generally offered in the evenings to accommodate students who have full-time jobs. A research thesis is not a requirement for the degree.

### Master's Thesis Option

The department welcomes applications for the thesis-based master's degree only from students who are currently enrolled at Northeastern.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Options

Complete one of the following options:

#### COURSEWORK OPTION

Code	Title	Hours
Complete 30 semester hours from the following courses:		
CHEM 5550 to CHEM 7750		30

#### THESIS OPTION

Code	Title	Hours
<b>Course Work</b>		
Complete 18 semester hours from the following:		18

CHEM 5550, or within the range of CHEM 5610 to CHEM 7320

#### Graduate Seminar

Seminar must be completed twice. At least one seminar must be taken for a letter grade.

2

## **Program Credit/GPA Requirements**

30 total semester hours required

Minimum 3.000 GPA required

## **Biodefense and Biosecurity, Graduate Certificate**

The Graduate Certificate in Biodefense and Biosecurity has been designed in response to a need in the biotechnology industry for individuals who desire to become professionals in biodefense or biosecurity. The concentration seeks to give individuals a background into the technology to detect, analyze, and respond to biosecurity threats. Enrolled students will study the microbiology and epidemiology of biological agents that are potential threats; identify and propose what countermeasures can be used; and through coursework develop expertise in the response, strategies, and policies related to biodefense and biosecurity. The graduate certificate consists of three biotechnology courses and one public policy and urban affairs course totaling 13 semester hours.

## **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## **Required Courses**

Code	Title	Hours
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 6610	Biosecurity and Bioterrorism	3
BIOT 6600	Agents of Bioterrorism	3
PPUA 6532	Building Resilience into Local Government	4

## **Program Credit/GPA Requirements**

13 total semester hours required

Minimum 3.000 GPA required

## **Biopharmaceutical Analytical Sciences, Graduate Certificate**

The Graduate Certificate in Biopharmaceutical Analytical Sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art analyses of protein with focus on the characterization of innovator and biosimilars. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills that enable them to increase productivity and further contribute to their professions. In addition, the certificate was designed for both individuals with and without experience in biopharmaceuticals and their analysis.

## **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
BIOT 6290	Foundation in Quality for Biotechnology	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3
CHEM 5617	Protein Mass Spectrometry Laboratory	3

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Biotechnology, Graduate Certificate

The Graduate Certificate in Biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in basic biotechnology concepts and skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical skills enabling them to increase productivity and allow for transitions into more biotechnology-related fields.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
BIOL 6299	Molecular Cell Biology for Biotechnology	3
BIOT 5120	Foundations in Biotechnology	3
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Biotechnology Enterprise, Graduate Certificate

The graduate certificate in biotechnology enterprise has been designed in response to a need in the biotechnology industry for individuals with a biotechnology background to obtain a strong foundation in the business aspects of biotechnology. Individuals, particularly those who are working in the field of biotechnology, will improve their business competency enabling them to better manage a team or move into a more business-orientated role.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

Code	Title	Hours
<b>Required Courses</b>		
BIOT 5120	Foundations in Biotechnology	3
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5225	Managing and Leading a Biotechnology Company	3

### **Elective**

Code	Title	Hours
Complete one elective from the following list:		
BIOT 5228	Planning and Executing Biotechnology Projects	3
ENTR 6210	Managing Operations in Early Stage Ventures	
ENTR 6211	Entrepreneurship: Services and Retail Business Creation	
ENTR 6212	Business Planning for New Ventures	
INTB 6200	Managing the Global Enterprise	
INTB 6212	Cultural Aspects of International Business	
MGSC 6200	Information Analysis	

### **Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

### **Biotechnology Regulatory Science, Graduate Certificate**

This certificate was designed in response to a need in the biotechnology industry for individuals, in particular regulators, to obtain a strong foundation in the science behind good regulatory practice today, specifically in relation to biopharmaceuticals.

### **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### **Core Requirements**

Code	Title	Hours
BIOT 5330	Drug Safety and Immunogenicity	3
BIOT 5500	Concepts in Regulatory Science	3
BIOT 5621	Protein Principles in Biotechnology	3
BIOT 6320 or BIOT 5340	Design and Development of Biopharmaceuticals Introduction to Biotherapeutic Approvals	3

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Experimental Biotechnology, Graduate Certificate

The graduate certificate in experimental biotechnology has been designed in response to a need in the biotechnology industry for individuals without a biotechnology background to obtain a strong foundation in lab-based, hands-on, biotechnology skills. Individuals, particularly those who are working in fields other than biotechnology, will acquire competency and learn new practical lab skills enabling them to increase productivity and transition into more biotechnology-related fields.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BIOT 5145	Biotechnology Lab Skills	1
BIOT 5219	The Biotechnology Enterprise	2
BIOL 5549	Inventions in Microbial Biotechnology	4
BIOT 6214	Experimental Design and Biostatistics	2
BIOT 7245	Biotechnology Applications Laboratory	3

## Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

### Manufacturing and Quality Operations in Biotechnology, Graduate Certificate

The graduate certificate in manufacturing and quality operations has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art biopharmaceutical manufacturing and quality operations. In particular, the focus of this certificate is training the workforce to ensure quality medicines are produced. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, have an opportunity to improve their competency and learn new practical skills, which enables them to increase productivity and further contribute to their professions.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BIOT 6300	Pharmaceutical Microbiology	3
BIOT 6310	CGMP Statutes and Regulation	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
BIOT 6340	Sterile Manufacturing Operations	3

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Molecular Biotechnology, Graduate Certificate

The graduate certificate in molecular biotechnology has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of state-of-the-art molecular biology techniques and advanced protein structure analysis. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 5750	Molecular Approaches in Biotechnology	3
BIOT 5810	Cutting-Edge Applications in Molecular Biotechnology	3
BIOT 5850	Higher-Order Structure Analytics	3

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Pharmaceutical Technologies, Graduate Certificate

The Graduate Certificate in Pharmaceutical Technologies has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of the stages of drug development, biopharmaceutical development. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development, and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	3
BIOT 6320	Design and Development of Biopharmaceuticals	3
CHEM 5550	Introduction to Glycobiology and Glycoprotein Analysis	3

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Process Science, Graduate Certificate

The graduate certificate in process sciences has been designed in response to a need in the biotechnology industry for individuals with an advanced knowledge of the principles and practices of process development of biopharmaceuticals. Individuals, particularly those who are working in the various sectors of biotechnology including basic research of biological systems, discovery, development and manufacturing of biopharmaceuticals, will improve their competency and learn new practical skills enabling them to increase productivity and further contribute to their professions.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BIOT 5560	Bioprocess Fundamentals	3
BIOT 5635	Downstream Processes for Biopharmaceutical Production	3
BIOT 5640	Drug Product Processes for Biopharmaceuticals	3
BIOT 6320	Design and Development of Biopharmaceuticals	3

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Vaccine Development, Graduate Certificate

The SARS-CoV-2 pandemic has reemphasized the importance of vaccines in our medical toolkit to prevent the spread of infectious diseases. The Certificate in Vaccine Development explores what vaccines are, how they work (immunization), how regulatory science has evolved in vaccine approvals, and how vaccines are created. This certificate includes three courses specifically focused on the science of vaccines and two courses focusing on cell culture and good manufacturing practices. Credits earned in this certificate may be used to satisfy requirements in the Master of Science in Biotechnology.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5630	Cell Culture Applications for Biopharmaceuticals	2
BIOT 5910	Vaccines and Immunization	3
BIOT 5920	Foundations in Vaccine Regulatory Science	3
BIOT 5930	Molecular Tools for Vaccine Design	3
BIOT 6310	CGMP Statutes and Regulation	3

## Program Credit/GPA Requirements

15 total semester hours required

Minimum 3.000 GPA required

### Marine and Environmental Sciences

Website (<http://www.northeastern.edu/mes/>)

**Geoffrey C. Trussell, PhD**

Professor and Chair

Marine Science Center

781.581.7370

781.581.6076 (fax)

gradmes@northeastern.edu

The PhD program in marine and environmental sciences is designed to train high-caliber and independent scientists whose research addresses fundamental and applied ecological and evolutionary questions at local, regional, national, and global scales.

This training will include both general and specialized coursework in ecology and evolution, geoscience, sustainability, and marine sciences, with curricular programs providing specialized options tailored to each student's research interests. Students benefit from top-notch research facilities at the Marine Science Center in Nahant and on the main campus in Boston. Graduates of the program are prepared for careers in academia, government agencies, and the private sector.

The Master of Science in Marine Biology, also known as the Three Seas Program, gives students an opportunity to learn in three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. In addition to rigorous coursework, the program offers the opportunity for students to formulate research questions, design and conduct critical experiments, and interpret and present results. The 15-month program culminates with an internship in the field and independent research project.

The Master of Science in Environmental Science and Policy is a joint program between the College of Science and the College of Social Sciences and Humanities. The interdisciplinary program aims to prepare the next generation of environmental professionals for dynamic opportunities focused on the science and policy of sustainability and resilience.

## Programs

### Doctor of Philosophy (PhD)

- Human Behavior and Sustainability Sciences (p. 964)
- Marine and Environmental Sciences (p. 960)

### Master of Science (MS)

- Climate Science and Engineering (p. 446)
- Environmental Science and Policy (p. 968)
- Marine Biology (p. 970)

### Graduate Certificate

- Sustainability Sciences (p. 972)

## Marine and Environmental Sciences, PhD

The PhD in Marine and Environmental Sciences (MES) program provides students with advanced course work and training in the concentration areas of marine sciences, geosciences, sustainability sciences, and ecology and evolutionary biology.

Students must pass three examinations during the course of their graduate studies:

1. An oral examination by the student's dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.
3. A defense of the student's written dissertation consisting of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern faculty and one external faculty member.

A cumulative GPA of 3.000 is required for graduation. All PhD students are required to have at least two first-authored publications submitted to or accepted in a peer-reviewed journal prior to their defense. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

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*Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Marine and Environmental Sciences (<https://catalog.northeastern.edu/graduate/science/marine-environmental-sciences/marine-environmental-sciences-ms/>) degree. Note that no students will be admitted directly into the Marine and Environmental Sciences program to pursue a master's degree.*

## PhD Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
Dissertation committee  
Qualifying examination  
Dissertation proposal  
Candidacy  
First-author publication  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Statistics</b>		
Complete one of the following:		4-5
EEMB 5522	Experimental Design Marine Ecology	
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
Alternative statistics course as approved by graduate committee		
<b>Research</b>		
Complete the following (repeatable) course twice:		8
EEMB 8984	Research	

### Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 961)
- Sustainability Sciences (p. 961)
- Geosciences (p. 962)
- Marine Sciences (p. 962)

### ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
<b>Seminars</b>		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2
<b>Concentration-Specific Electives</b>		
Complete 12 semester hours from the following:		
EEMB 5130	Population Dynamics	
EEMB 5504	Biology of Corals	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508	Marine Birds and Mammals	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5520	Tropical Marine Ecology	
ENVR 5210	Environmental Planning	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	

Substitutions may be made with approval of graduate committee.

### SUSTAINABILITY SCIENCES

Code	Title	Hours
<b>Seminars</b>		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8103	Readings in Sustainability Sciences	2
<b>Concentration-Specific Electives</b>		
Complete 12 semester hours from the following:		
EEMB 5130	Population Dynamics	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5518	Ocean and Coastal Processes	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5260	Geographical Information Systems	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6406	Analyzing Complex Digitized Data	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 7346	Resilient Cities	

Substitutions may be made with approval of graduate committee.

**GEOSCIENCES**

Code	Title	Hours
<b>Seminars</b>		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		
EEMB 7101	Seminar in Marine Sciences	2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
<b>Readings</b>		
EEMB 8104	Readings in Geosciences	2
<b>Concentration-Specific Electives</b>		
Complete 12 semester hours from the following:		
EEMB 5518	Ocean and Coastal Processes	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5190	Soil Science	
ENVR 5210	Environmental Planning	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	

Substitutions may be made with approval of graduate committee.

**MARINE SCIENCES**

Code	Title	Hours
<b>Seminars</b>		
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8101	Readings in Marine Sciences	2
<b>Concentration-Specific Electives</b>		
Complete 12 semester hours from the following:		
EEMB 5130	Population Dynamics	
EEMB 5504	Biology of Corals	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5508	Marine Birds and Mammals	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5520	Tropical Marine Ecology	
ENVR 5242 and ENVR 5243	Ancient Marine Life and Lab for ENVR 5242	
ENVR 5260	Geographical Information Systems	

Substitutions may be made with approval of graduate committee.

**Dissertation**

Code	Title	Hours
EEMB 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

30 total semester hours required

Minimum 3.000 GPA required

**Advanced Entry Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Dissertation committee  
Qualifying examination  
Dissertation proposal  
Candidacy  
First-author publication  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Statistics</b>		
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	4-5
EEMB 5522	Experimental Design Marine Ecology	
Alternative statistics course as approved by graduate committee		

## Concentration

Complete one of the following concentrations:

- Ecology and Evolutionary Biology (p. 961)
- Sustainability Sciences (p. 961)
- Geosciences (p. 962)
- Marine Sciences (p. 962)

### ECOLOGY AND EVOLUTIONARY BIOLOGY

Code	Title	Hours
<b>Seminars</b>		
EEMB 7102	Seminar in Ecology and Evolutionary Biology	2
Complete one of the following:		
EEMB 7101	Seminar in Marine Sciences	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8102	Readings in Ecology and Evolutionary Biology	2

### SUSTAINABILITY SCIENCES

Code	Title	Hours
<b>Seminars</b>		
EEMB 7103	Seminar in Sustainability Sciences	2
Complete one of the following:		
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8103	Readings in Sustainability Sciences	2

**GEOSCIENCES**

Code	Title	Hours
<b>Seminars</b>		
EEMB 7104	Seminar in Geosciences	2
Complete one of the following:		2
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
<b>Readings</b>		
EEMB 8104	Readings in Geosciences	2

**MARINE SCIENCES**

Code	Title	Hours
<b>Seminars</b>		
EEMB 7101	Seminar in Marine Sciences	2
Complete one of the following:		2
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
<b>Readings</b>		
EEMB 8101	Readings in Marine Sciences	2

**Dissertation**

Code	Title	Hours
EEMB 9990	Dissertation Term 1	
EEMB 9991	Dissertation Term 2	

**Program Credit/GPA Requirements**

10 total semester hours required

Minimum 3.000 GPA required

**Human Behavior and Sustainability Sciences, PhD****Overview**

The persistent failure to integrate the social, behavioral, and cognitive sciences with ecological and geophysical sciences is a critical friction point reducing the viability and effectiveness of sustainability solutions. Therefore, a degree program that combines training in psychology with the ecological and geophysical sciences will produce boundary-breaking scholars who can accelerate sustainability solutions that are robustly informed by the results of scientific research. The proposed curriculum integrates degree requirements from existing PhD programs in psychology and marine and environmental sciences (sustainability sciences concentration), with the addition of a set of specialized core courses and integrated cross-disciplinary research training. It also allows students broad latitude in designing their specialty within the parameters of the program.

The PhD in Human Behavior and Sustainability Sciences program provides students with the following advanced coursework and training. Students must pass two examinations during the course of their graduate studies to achieve candidacy:

1. A qualifying paper that the student will write and present to their dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.

At the end of the program, students will defend their written dissertation, which consists of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern University faculty and one external faculty member.

A cumulative grade-point average of 3.000 is required for graduation. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
 Dissertation committee  
 Qualifying paper and presentation  
 Dissertation proposal and presentation  
 Candidacy  
 Dissertation/dissertation defense  
 Teaching experience

## Core Requirements

Code	Title	Hours
EEMB 7103	Seminar in Sustainability Sciences	2
EEMB 8103	Readings in Sustainability Sciences	2
ENVR 5450	Applied Social-Ecological Systems Modeling	4
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
PSYC 7210	Seminar in Cognition	3

## Research

Code	Title	Hours
PSYC 8401 or EEMB 8984	Research Project Research	6

## Electives

Code	Title	Hours
Complete 8 semester hours from the following:		8
<b>Psychology Breadth Courses</b>		
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Cognitive Science	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5170	Social and Affective Science	
<b>Sustainability Breadth Courses</b>		
EEMB 5130	Population Dynamics	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5260	Geographical Information Systems	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5700	Streams and Watershed Ecology	
ENVR 5750	Urban Ecology	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	
ENVR 6150	Food Security and Sustainability	

ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500
INSH 5301	Introduction to Computational Statistics
INSH 5302	Information Design and Visual Analytics
INSH 6300	Research Methods in the Social Sciences
INSH 6406	Analyzing Complex Digitized Data
INTL 5100	Climate and Development
PHTH 5214	Environmental Health
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5267	Climate Policy and Justice
PPUA 5268	International Environmental Policy
<b>Psychology Depth Courses</b>	
PSYC 7210	Seminar in Cognition
PSYC 7250	Seminar in Clinical Neuroscience
PSYC 7300	Advanced Quantitative Analysis
<b>Sustainability Depth Courses</b>	
EEMB 7101	Seminar in Marine Sciences
EEMB 7102	Seminar in Ecology and Evolutionary Biology
EEMB 7103	Seminar in Sustainability Sciences
EEMB 7104	Seminar in Geosciences
ENVR 6102	Environmental Science and Policy Seminar 2
LPSC 7312	Cities, Sustainability, and Climate Change
POLS 7334	Social Networks
PPUA 6101	Environmental Science and Policy Seminar 1
PPUA 7346	Resilient Cities
SOCL 7267	Environment, Health, and Society

## Dissertation

Code	Title	Hours
Please enroll in either EEMB 9990 or PSYC 9990 for one semester after achieving candidacy. In the following semester, please enroll in either EEMB 9991 or PSYC 9991.		
EEMB 9990 or PSYC 9990	Dissertation Term 1	
EEMB 9991 or PSYC 9991	Dissertation Term 2	
	Dissertation Term 1	
	Dissertation Term 2	

## Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

## Climate Science and Engineering, MS

### Overview

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses and includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

## Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below; any core course not used to meet this core course requirement can be taken as a restricted elective:		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change Climate and Atmospheric Change	
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	
CIVE 5365	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5366	Air Quality Engineering and Science	
CIVE 5670 or ENVR 5670	Global Biogeochemistry Global Biogeochemistry	
CIVE 7110	Critical Infrastructure Resilience	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below.		12

### REPORT OPTION

Code	Title	Hours
CIVE 7945 or EEMB 8984	Master's Project Research	4
Complete 8 semester hours from the restricted electives course list below.		8

### THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
EEMB 8984	Research (Completed twice)	
Complete 4 semester hours from the restricted electives course list below.		4

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5563	Advanced Spatial Analysis	
INTL 5100	Climate and Development	
LAW 7634	Energy Law and Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting	
ME 5685	Solar Thermal Engineering	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
SBSY 5100	Sustainable Design and Technologies in Construction	
SBSY 5200	Sustainable Engineering Systems for Buildings	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

## Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
-

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Seminars</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
<b>Skills Courses</b>		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List and one course from the College of Social Sciences and Humanities Skills Course List.		8
<i>College of Science Skills Course List</i>		
EEMB 5130	Population Dynamics	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 6500	Biostatistics	
<i>College of Social Sciences and Humanities Skills Course List</i>		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

## Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one course from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

### COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

### COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5100 - PPUA 7346		
SOCL 7267	Environment, Health, and Society	

## Program Credit/GPA Requirements

36 total semester hours required  
Minimum 3.000 GPA required

### Marine Biology, MS

The MS in Marine Biology provides students the opportunity to study marine biology in three distinct environments at three world-renowned research facilities in New England, the Caribbean, and the Pacific Northwest. An internship in the field and independent research project provide the capstone to the fifteen-month graduate program.

Much more than course work in a classroom, the MS in Marine Biology delivers inquiry-based curriculum in marine science during which our students formulate research questions, design and conduct critical experiments, and interpret and present results. You will have an opportunity not only learn science, you have an opportunity to learn how to do science and become a marine scientist.

This program is for students eager to broaden their knowledge of marine biology or who want to further refine their interests.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Students register for International Study—Three Seas Program (ABRS 5120) for the fall and spring terms of year 1.

Code	Title	Hours
<b>Seminar</b>		
EEMB 5303 or EEMB 5305	Marine Biology Careers Seminar Professional Development for Ocean Sciences	1-2
<b>Biology</b>		
EEMB 5504 and EEMB 5505	Biology of Corals and Lab for EEMB 5504	3
EEMB 5506 and EEMB 5507	Biology and Ecology of Fishes and Lab for EEMB 5506	3
EEMB 5508	Marine Birds and Mammals	3
EEMB 5518 and EEMB 5519	Ocean and Coastal Processes and Lab for EEMB 5518	3
EEMB 5533 and EEMB 5535	Marine Invertebrate Zoology and Botany and Lab for EEMB 5533	3
<b>Sustainability</b>		
EEMB 5538	Conservation and Restoration of Marine Systems	3
EEMB 5542	Marine Spatial Planning	4
EEMB 5546	Sustainability of the Land-Sea Interface	3
<b>Ecology</b>		
EEMB 5520	Tropical Marine Ecology	2
EEMB 5522 or EEMB 5525	Experimental Design Marine Ecology Advanced Field Methods in Marine Ecology	3-4
EEMB 5540 and EEMB 5541	Changing Global Oceans and Lab for EEMB 5540	3
<b>Research</b>		
Take the following (repeatable) course twice:		2
EEMB 7674	Marine Biology Research Project	

## Program Credit/GPA Requirements

38 total semester hours required  
Minimum 3.000 GPA required

## Plan of Study

### Fall Start

#### Year 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EEMB 5305		2 EEMB 5504 and EEMB 5505		3 EEMB 7674	1
EEMB 5522		4 EEMB 5506 and EEMB 5507		3	
EEMB 5546		3 EEMB 5508		3	
EEMB 5542		4 EEMB 5518 and EEMB 5519		3	
EEMB 5533 and EEMB 5535		3 EEMB 5520		2	
		EEMB 5538		3	
		EEMB 5540 and EEMB 5541		3	
	16			20	1

#### Year 2

Fall	Hours
EEMB 7674	1
	1

Total Hours: 38

### Summer II Start

#### Year 1

		Summer 2	Hours
		EEMB 5546	3
		EEMB 5525	3
			6

#### Year 2

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
EEMB 5508		3 EEMB 5542	4	EEMB 7674	1
EEMB 5538		3 EEMB 5305	2		
EEMB 5504 and EEMB 5505		3 MES Elective 5000+	4		
EEMB 5533 and EEMB 5535		3			
EEMB 5506 and EEMB 5507		3			
EEMB 5518 and EEMB 5519		3			
EEMB 5520		2			
	20		10		1

#### Year 3

Fall	Hours
EEMB 7674	1
	1

Total Hours: 38

## Sustainability Sciences, Graduate Certificate

### Overview

Environmental sustainability challenges are inherently complex and multidisciplinary and will require a workforce capable of collaborating across interdisciplinary teams. Thus, it is critical that the next generation of sustainability scientists and engineers receive broad, interdisciplinary training so that they are better prepared to address these complex challenges. This certificate will provide social science and engineering students with fundamental training in sustainability science.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
<b>Introduction to Sustainability Science</b>		
ENVR 6102	Environmental Science and Policy Seminar 2	4
<b>Physical and Environmental Processes and Systems</b>		
Complete one of the following:		
ENVR 5150	Climate and Atmospheric Change	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5670	Global Biogeochemistry	
ENVR 5700	Streams and Watershed Ecology	
<b>Environmental Planning, Management, and Sustainability</b>		
Complete one of the following:		
EEMB 6475	Advanced Wildlife Ecology	
ENVR 5210	Environmental Planning	
ENVR 5220	Ecosystem-Based Management	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5750	Urban Ecology	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	
ENVR 6150	Food Security and Sustainability	
<b>Research and Analytical Skills Development</b>		
Complete one of the following:		
EEMB 5130	Population Dynamics	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 5500	Advanced Biostatistics	
ENVR 5984	Research	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Mathematics

Website (<https://cos.northeastern.edu/mathematics/>)

**Egon Schulte, PhD**

Professor and Chair

617.373.2450

Mathematics is of ever-increasing importance to our society and everyday life. It has long been the language of science and technology and provides a rich source of methods for analyzing and solving problems encountered in the physical world. Today, mathematics is essential in virtually all fields of human endeavor, including business, the arts, and the social sciences.

PhD students work with internationally recognized faculty in research programs in both pure and applied mathematics. The program is designed to provide students with a broad overview of current mathematics and a strong command of areas of specialization.

The Department of Mathematics also offers Master of Science degrees in mathematics, applied mathematics, and operations research, as well as a graduate certificate in applied mathematics. These programs prepare students for careers in business, industry, or government. Students pursuing degrees in applied math and operations research take part in Northeastern University's signature co-op program.

In addition to the numerous seminars and colloquia at Northeastern, there are ample opportunities for students in the Boston area to learn about important recent advances in the field.

## Programs

### Doctor of Philosophy (PhD)

- Mathematics (p. 973)

### Master of Science (MS)

- Applied Mathematics (p. 980)
- Mathematics (p. 982)
- Statistics (p. 983)
- Statistics—Connect (p. 985)

### Master of Science in Operations Research (MSOR)

- Operations Research (p. 987)

### Graduate Certificate

- Applied Mathematics (p. 988)

## Mathematics, PhD

### Course Requirements

Students entering with a bachelor's degree are required to take 48 semester hours of coursework divided between foundational and advanced offerings. Students entering the program will be allowed to place out of some (possibly all) of the six basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum GPA of 3.000 is required for degree conferral.

### Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

### Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

### Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

## Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.
- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Bachelor's Degree Entry

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Four qualifying examinations  
Annual review  
Teaching requirement  
Doctoral candidacy  
Dissertation committee  
Dissertation proposal  
Progress report and presentation  
Dissertation defense

### Prerequisites

Code	Title	Hours
<b>Algebra and Analysis</b>		
Complete 0–8 semester hours from the following:		0-8
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5111	Algebra 1	

## Advanced Coursework

Code	Title	Hours
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 976)		32

## Tracks

Complete one of the following three tracks:

- Pure Track (p. 975)
- Discrete Track (p. 975)
- Probability and Statistics Track (p. 976)

## Dissertation

Code	Title	Hours
MATH 9990	Dissertation Term 1	
MATH 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

48–56 total semester hours required

Minimum 3.000 GPA required

### PURE TRACK

Code	Title	Hours
<b>Analysis</b>		
MATH 5102	Analysis 2: Functions of Several Variables	4
<b>Algebra</b>		
MATH 5112	Algebra 2	4
<b>Foundational Courses</b>		
Complete up to 8 semester hours from the following:		0-8
MATH 5121	Topology 1	
MATH 5122	Geometry 1	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	

### DISCRETE TRACK

Code	Title	Hours
<b>Algebra</b>		
MATH 5112	Algebra 2	4
<b>Probability</b>		
MATH 7241	Probability 1	4
<b>Foundational Courses</b>		
Complete up to 8 semester hours from the following:		0-8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7342	Mathematical Statistics	

**PROBABILITY AND STATISTICS TRACK**

Code	Title	Hours
<b>Analysis</b>		
Complete 4 semester hours from the following:		4
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 7203	Numerical Analysis 1	
<b>Probability</b>		
MATH 7241 or MATH 7342	Probability 1 Mathematical Statistics	4
<b>Foundational Courses</b>		
Complete up to 8 semester hours from the following:		8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	

**Advanced Coursework List**

Code	Title	Hours
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7301	Functional Analysis	
MATH 7302		
MATH 7303		
MATH 7311	Commutative Algebra	
MATH 7315	Algebraic Number Theory	
MATH 7316		
MATH 7317	Modern Representation Theory	
MATH 7320	Modern Algebraic Geometry	
MATH 7321	Topology 3	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	
MATH 7346 to MATH 7361		
MATH 7371	Morse Theory	
MATH 7374		
MATH 7976 to MATH 8986		
MATH 9984	Research	

**Topics**

Only three topics courses are allowed.

MATH 7362	Topics in Algebra
MATH 7363	Topics in Algebraic Geometry
MATH 7364	Topics in Representation Theory
MATH 7375	Topics in Topology
MATH 7381	Topics in Combinatorics
MATH 7382	Topics in Probability

**Readings**

Only two readings courses are allowed.

MATH 7721	Readings in Topology
MATH 7733	Readings in Graph Theory
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7736	Readings in Discrete Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7771	Readings in Geometry

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Course Requirements

Advanced students who enter the PhD program with a master's degree (or equivalent) will be allowed to place out of some (possibly all) of the six basic-level courses; the graduate coordinator together with the first-year graduate advisor will determine the allowable course substitutions and will advise the student which foundational courses to take. Students may satisfy requirements for Algebra 1 (MATH 5111) and Analysis 1: Functions of One Variable (MATH 5101) by taking qualifying exams in algebra 1 and in analysis 1 at the start of the program. Students may satisfy foundational course requirements if they demonstrate proficiency by passing an assessment exam in the course at the beginning of the semester or by demonstrating that they have taken a similar course and have adequate knowledge of the course material (syllabus and transcript are required; a brief oral examination is also required in that case). Academic advising will happen just before the start of each term and during the add/drop period in order to plan a student's course registration for the term. A complete listing of foundational and advanced courses is available from the Department of Mathematics and the graduate dean's office. Students are not permitted to register for more than two "readings" courses and three "topics" courses for credit toward the degree without explicit permission from the graduate dean. A minimum grade-point average (GPA) of 3.000 is required for degree conferral.

## Teaching Requirement

Some teaching experience is required while in the program. Students must attend university-led TA training at the start of the program; attend a one-semester TA training course conducted by faculty from the Department of Mathematics teaching committee; spend one semester shadowing faculty in the undergraduate classroom; and perform recitations and grading for the undergraduate course they are shadowing.

## Qualifying Exams

Qualifying exam sessions are given once in spring and once in fall. Students will be required to pass four qualifying exams: algebra 1, analysis 1, and two other exams. The possible additional topics for qualifying exams are algebra 2, analysis 2, combinatorics, geometry, ordinary differential equations, partial differential equations, probability, statistics, topology, and algebraic geometry. A qualifying exam may be taken twice by any student. Additional attempts may be allowed at the discretion of the graduate committee with permission from the graduate dean in the College of Science. Two qualifying exams should be passed no later than the end of the second year and all four by the end of the third year.

## Doctoral Candidacy

PhD candidacy is reached when all of the following conditions are met:

- Completion of eight advanced courses
- Identification of an unsolved research problem
- Successful passing of four qualifying exams
- Assignment of PhD supervisor and creation of a 1-page initial plan
- Completion of a 3-page plan of research
- Completion of a 10-page progress report and a one-hour defense of proposal, presented to supervisor and three faculty members of graduate committee

## Dissertation Requirement

Each candidate must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret, in a logical manner, the results of the research. There are two stages to this process:

- **Stage 1:** Students in the PhD program must have a dissertation supervisor within two years after joining the PhD program. The department views the failure of a student to find a supervisor within two years of joining the PhD program with concern and considers this sufficient cause to review the student's status in the PhD program. The process of obtaining a dissertation supervisor always involves two choices—the student chooses the supervisor, and the supervisor chooses the student. For this reason, the department does not guarantee a dissertation supervisor for every student, but the department recognizes its responsibility to help the student find a satisfactory match. This aid is usually provided by the student's graduate advisor, who should be familiar with the student's progress in finding a dissertation supervisor. The dissertation supervisor guides the student's further education as well as directs the student's dissertation. The dissertation itself must represent an original solution of a problem in the chosen area of mathematics that makes a significant contribution to the mathematical knowledge in that area. Students must enroll in Dissertation or Dissertation Continuation while fulfilling the dissertation requirements.
- **Stage 2 (dissertation defense):** The final oral examination on the dissertation is held in accordance with university regulations and given by a dissertation committee of four faculty members (three from the university, including the supervisor, and one from outside Northeastern University). The dissertation supervisor should propose this dissertation committee to the graduate committee for its approval at least one month before the PhD dissertation defense.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Four qualifying examinations

Annual review

Teaching requirement

Doctoral candidacy

Dissertation committee

Dissertation proposal

Progress report and presentation

Dissertation defense

Code	Title	Hours
Complete 0–16 semester hours of the following courses:		
MATH 5101	Analysis 1: Functions of One Variable	0-16
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	

## Advanced Coursework

Code	Title	Hours
Complete 32 semester hours from the advanced coursework list. Only two readings and three topics courses are allowed. (p. 976)		
		32

## Tracks

Complete one of the following three tracks:

- Pure Track (p. 975)
- Discrete Track (p. 975)
- Probability and Statistics Track (p. 976)

## Dissertation

Code	Title	Hours
MATH 9990	Dissertation Term 1	
MATH 9991	Dissertation Term 2	

## Program Credit/GPA Requirements

32–56 total semester hours required

Minimum 3.000 GPA required

**PURE TRACK**

Code	Title	Hours
<b>Foundational Courses</b>		
Complete 0–8 semester hours from the following:		0-8
MATH 5121	Topology 1	
MATH 5122	Geometry 1	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	

**DISCRETE TRACK**

Code	Title	Hours
<b>Foundational Courses</b>		
Complete 0–8 semester hours from the following:		0 - 8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5111	Algebra 1	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	

**PROBABILITY AND STATISTICS TRACK**

Code	Title	Hours
<b>Foundational Courses</b>		
Complete 0–8 semester hours from the following:		0 - 8
MATH 5102	Analysis 2: Functions of Several Variables	
MATH 5112	Algebra 2	
MATH 5352	Quantum Computation and Information	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7241	Probability 1	
MATH 7342	Mathematical Statistics	

**ADVANCED COURSEWORK LIST**

Code	Title	Hours
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7301	Functional Analysis	
MATH 7302		
MATH 7303		
MATH 7311	Commutative Algebra	
MATH 7315	Algebraic Number Theory	
MATH 7316		
MATH 7317	Modern Representation Theory	
MATH 7320	Modern Algebraic Geometry	
MATH 7321	Topology 3	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7343	Applied Statistics	

MATH 7344	Regression, ANOVA, and Design
MATH 7346 to MATH 7361	
MATH 7371	Morse Theory
MATH 7374	
MATH 7976 to MATH 8986	
MATH 9984	Research

**Topics**

Only three topics courses are allowed.

MATH 7362	Topics in Algebra
MATH 7363	Topics in Algebraic Geometry
MATH 7364	Topics in Representation Theory
MATH 7375	Topics in Topology
MATH 7381	Topics in Combinatorics
MATH 7382	Topics in Probability

**Readings**

Only two readings courses are allowed.

MATH 7721	Readings in Topology
MATH 7733	Readings in Graph Theory
MATH 7734	Readings in Algebra
MATH 7735	Readings in Algebraic Geometry
MATH 7736	Readings in Discrete Geometry
MATH 7741	Readings in Probability and Statistics
MATH 7771	Readings in Geometry

**Applied Mathematics, MS**

New applications of mathematics are constantly being discovered, and established techniques are being applied in new ways and in emerging fields. Northeastern University's Master of Science in Applied Mathematics caters to students who are looking to enter or who are currently working in a variety of applied math careers such as data science and high-tech firms, computer information and software firms, financial service and investment firms, academic institutions, and research institutes. Northeastern's master's program offers students an opportunity to obtain solid knowledge of mathematical modeling, statistics, and data analysis, as well as excellent programming skills, through experiential learning and co-op experiences from industry.

Students may complete a data science concentration or an electives option. The value of the worldwide Big Data market is growing exponentially. Data science rooted in applied mathematics is essential in exploring Big Data from a wide range of science, businesses, and industries. The electives option allows students to personalize their education with more in-depth knowledge of data science, statistics, or other areas of interest in applied mathematics.

**Data Science Concentration**

Data science is an interdisciplinary field using techniques and theories drawn from mathematics, statistics, computer science, information science, and related fields to uncover insights hidden in data and to make predictions and decisions. The data science concentration offers students opportunities to learn the mathematical modeling, probability, and statistics that are the theoretical background for data science. Courses in data visualization; machine learning and deep learning; statistical inference; algorithmic, numerical, and computational thinking; experimental design; and coding are also offered. The program offers a multimodal approach including lecture courses, data-driven computer labs, and industry projects. Some courses listed for this program are in collaboration with the College of Engineering and the Khoury College of Computer Sciences.

**Electives Option**

Application of mathematical modeling and methods are widely involved in different fields such as computer science, engineering, finance, health science, social science, artificial intelligence, etc. The electives option allows students to design their advanced coursework around an area of specific interest, pursue a personalized training in applied mathematics, or strengthen an application to a PhD program.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Modeling and Linear Algebra</b>		
Complete 4 semester hours from the following:		
MATH 5110	Applied Linear Algebra and Matrix Analysis	4
MATH 5111	Algebra 1	
MATH 5131	Introduction to Mathematical Methods and Modeling	
<b>Probability and Analysis</b>		
Complete 4 semester hours from the following:		
MATH 5101	Analysis 1: Functions of One Variable	4
MATH 7241	Probability 1	
<b>Statistics</b>		
Complete 8 semester hours from the following:		
MATH 7243	Machine Learning and Statistical Learning Theory 1	8
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	

## Concentration or Electives Option

A concentration is not required. Students may complete the electives option in lieu of a concentration.

- Data Science (p. 981)
- Electives (p. 982)

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

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## Data Science Concentration

Code	Title	Hours
No more than 8 semester hours of coursework outside of the MATH subject code may be applied to the requirements of this concentration.		
<b>Core</b>		
Complete 8 semester hours from the following. Students may take other Khoury College of Computer Sciences courses not on the list in consultation with their faculty advisor.		
CS 5800	Algorithms	8
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
<b>Electives</b>		
Complete 8 semester hours of courses at the 5000 level or above in the following subject area. See suggested elective course list. (p. 982)		
MATH		8

**Electives Option**

Code	Title	Hours
Complete 16 semester hours in the following subject area. Students may take MATH courses at the 5000 level or above listed in other concentrations or the suggested elective course list. Courses outside of MATH may be chosen with faculty approval.		16
No more than 8 semester hours of coursework outside of the MATH subject code may be applied to requirements of this option.		
MATH		

**Suggested Elective Course List**

Code	Title	Hours
Students may complete other MATH courses not listed below and courses outside of MATH in consultation with their faculty advisor.		
DS 5110	Introduction to Data Management and Processing	
EECE 7205	Fundamentals of Computer Engineering	
MATH 5352	Quantum Computation and Information	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Additional Courses**

The following are some theoretical MATH courses usually taken in the PhD program (these may not be offered every academic year):

MATH 5102	Analysis 2: Functions of Several Variables
MATH 5112	Algebra 2
MATH 5121	Topology 1
MATH 7202	Partial Differential Equations 1
MATH 7221	Topology 2
MATH 7311	Commutative Algebra
MATH 7315	Algebraic Number Theory
MATH 7320	Modern Algebraic Geometry
MATH 7371	Morse Theory
MATH 7381	Topics in Combinatorics
MATH 7382	Topics in Probability
MATH 7733	Readings in Graph Theory
MATH 7741	Readings in Probability and Statistics
MATH 8450	Research Seminar in Mathematics

**Mathematics, MS**

This program offers students with a bachelor's degree in mathematics or a related field an opportunity to broaden their knowledge in the several fields of mathematics and its applications. The program is designed to prepare graduates for careers in business, industry, or government.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Algebra 1 and Analysis 1</b>		
MATH 5101	Analysis 1: Functions of One Variable	4
MATH 5111	Algebra 1	4
<b>Algebra 2 and Analysis 2</b>		
MATH 5102	Analysis 2: Functions of Several Variables	4
MATH 5112	Algebra 2	4

## Electives

Code	Title	Hours
Complete 16 semester hours from the following; no course can be used to satisfy both a requirement and an elective:		
MATH 5121	Topology 1	
MATH 5122	Geometry 1	
MATH 7202	Partial Differential Equations 1	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7221	Topology 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7234	Optimization and Complexity	
MATH 7241	Probability 1	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7311	Commutative Algebra	
MATH 7321	Topology 3	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Statistics, MS

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

### Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 985) (Bouvé College of Health Sciences)
- Statistical Machine Learning (p. 985) (Khoury College of Computer Sciences)
- Statistical Theory and Modeling (p. 985) (College of Science)

### Experiential Courses

Code	Title	Hours
	Complete 2 semester hours from the following (courses may be repeated):	2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

### Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	0
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	0

### Program Credit/GPA Requirements

31–32 total semester hours required

Minimum 3.000 GPA required

**BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)**

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	12
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Statistics, MS—Connect**

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical Machine Learning—Khouri College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		
CS 5001	Intensive Foundations of Computer Science	8-10
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

## Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

## Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 986) (Bouvé College of Health Sciences (<http://northeastern.edu/bouve/>))
- Statistical Machine Learning (p. 987) (Khoury College of Computer Sciences (<https://khoury.northeastern.edu/>))
- Statistical Theory and Modeling (p. 987) (College of Science (<http://www.northeastern.edu/cos/>))

## Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		
MATH 6910	Master's Project	2
PHTH 6880	Statistical Consultancy	

## Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	

## Program Credit/GPA Requirements

39-41 total semester hours required

Minimum 3.000 GPA required

## BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	

PHTH 6802	Causal Inference 2
PHTH 6810	Survival Analysis
PHTH 6820	Design and Analysis of Clinical Trials

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Operations Research, MSOR**

This program seeks to train students in the basic techniques and theory of operations research and their applications to real-world problems. Graduates should have developed their analytical skills to attack complex, large-scale optimization problems of both a deterministic and stochastic nature. Eight 4-semester-hour graduate courses are required for this degree. Previous course work will be evaluated to determine proficiency in certain content areas and degree plan may be tailored accordingly. In some cases, a student may be required to take an assessment exam to determine content and knowledge proficiency. No course can be used to satisfy both a requirement and an elective. To qualify for degree conferral, a minimum cumulative grade-point average of 3.000, equivalent to a grade of B, must be obtained. Some courses listed for this program are offered in the College of Engineering or the Khoury College of Computer Sciences.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Probability</b>		
Complete 4 semester hours from the following:		
MATH 7241	Probability 1	4
MATH 7341	Probability 2	
OR 7230	Probabilistic Operation Research	
<b>Statistics</b>		
MATH 7342	Mathematical Statistics	4
or MATH 7343	Applied Statistics	
<b>Operations Research</b>		
OR 6205	Deterministic Operations Research	4
<b>Optimization and Complexity</b>		
MATH 7234	Optimization and Complexity	4

**Electives**

Code	Title	Hours
Complete 16 semester hours from the following:		
CS 5800	Algorithms	
CS 6140	Machine Learning	
CS 7805	Complexity Theory	
CSYE 6200	Concepts of Object-Oriented Design	
CSYE 6205	Concepts of Object-Oriented Design with C++	
EMGT 5220	Engineering Project Management	
EMGT 6225	Economic Decision Making	
EMGT 6305	Financial Management for Engineers	
GE 5010	Customer-Driven Technical Innovation for Engineers	
GE 5100	Product Development for Engineers	
IE 5400	Healthcare Systems Modeling and Analysis	
IE 5500	Systems Engineering in Public Programs	
IE 5617	Lean Concepts and Applications	
IE 5630	Biosensor and Human Behavior Measurement	
IE 6300	Manufacturing Methods and Processes	
IE 7200	Supply Chain Engineering	
IE 7215	Simulation Analysis	
IE 7275	Data Mining in Engineering	
IE 7280	Statistical Methods in Engineering	
IE 7285	Statistical Quality Control	
IE 7290	Reliability Analysis and Risk Assessment	
IE 7315	Human Factors Engineering	
MATH 7203	Numerical Analysis 1	
MATH 7205	Numerical Analysis 2	
MATH 7223	Riemannian Optimization	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7344	Regression, ANOVA, and Design	
OR 7240	Integer and Nonlinear Optimization	
OR 7310	Logistics, Warehousing, and Scheduling	

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

**Applied Mathematics, Graduate Certificate**

Large streams of data have brought mathematical modeling to nearly every field and industry. More than ever, a deep understanding of the fundamentals and applications of these models is the differentiator between the success and failure of projects in statistics, machine learning, probabilistic modeling, and optimization. From constructing financial tools and optimizing supply chains, to computer-guided brain surgery and to quantum computing, a foundational understanding of advanced mathematics can give you the tools to create the ideas and technology that will drive the 21st century.

A graduate certificate in applied mathematics gives you the opportunity to study the fundamentals of statistical reasoning, mathematical modeling, and modern mathematical methods in a Tier 1 research department. Shorter than the full master's, the graduate certificate allows you to take up to four courses from the Department of Mathematics. Our courses cover a wide range of topics, from theory courses about the fundamental structures of mathematical objects, to project-based applied courses where students use modeling to solve research-level problems from academic and industry partners.

All applied mathematics courses are taught in the evening to accommodate working students. Mathematics and pure math courses also count toward this certificate.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Modeling</b>		
Complete 4 semester hours from the following:		
MATH 5110	Applied Linear Algebra and Matrix Analysis	
MATH 5131	Introduction to Mathematical Methods and Modeling	
MATH 7203	Numerical Analysis 1	
MATH 7233	Graph Theory	
MATH 7241	Probability 1	
<b>Statistics</b>		
Complete 4 semester hours from the following:		
MATH 7243	Machine Learning and Statistical Learning Theory 1	
MATH 7343	Applied Statistics	

### Electives

Code	Title	Hours
Complete 8 semester hours from subject area MATH, including but not limited to the following:		
MATH 5101	Analysis 1: Functions of One Variable	
MATH 5111	Algebra 1	
MATH 5121	Topology 1	
MATH 7202	Partial Differential Equations 1	
MATH 7205	Numerical Analysis 2	
MATH 7223	Riemannian Optimization	
MATH 7234	Optimization and Complexity	
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

### Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

## Physics

Website (<https://cos.northeastern.edu/physics/>)

**Mark Williams, PhD**

Professor and Chair

110 Dana Research Center

617.373.2902

617.373.2943 (fax)

[gradphysics@northeastern.edu](mailto:gradphysics@northeastern.edu)

Physics PhD and Master of Science students at Northeastern University have the opportunity to explore, discover, and apply the fundamental principles that guide the universe. The program specializes in several subfields that reflect the forefront research activities of the department. These specializations include biological physics, condensed matter physics, elementary particle physics, astrophysics, nanomedicine, nanophysics, quantum science, and network science.

The Department of Physics also offers a Graduate Certificate in Nanomedicine. The certificate is designed for students, engineers, and physicians to develop competency and practical skills in the application of nanotechnology to problems in medicine. This program is appropriate for those working in or seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields.

## **Programs**

### **Doctor of Philosophy (PhD)**

- Physics (p. 990)

### **Master of Science (MS)**

- Applied Physics and Engineering (p. 480)
- Complex Network Analysis (p. 999)
- Nanomedicine (p. 1001)
- Physics (p. 1004)

### **Graduate Certificate**

- Nanomedicine (p. 1007)

## **Physics, PhD**

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront research activities of the department, including biological physics, condensed matter physics, elementary particle physics, astrophysics, nanomedicine, and network science. The program for the PhD degree consists of the required course work, a qualifying examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

## **Coursework**

The required courses are grouped into two sets, Part 1 and Part 2, having a total of 42 semester hours as a minimum. Part 1 courses (first-year courses) are typically taken prior to the qualifying exam. Students without a master's degree must complete all Part 1 courses in the first year to remain in good academic standing in the graduate program. Part 2 courses (second-year courses) may be taken before or after passing the qualifying exam.

## **Grade Requirements**

The minimum grade required for the successful completion of the Part 1 courses is a B (3.000) average. Students will only be allowed to take the qualifying exam if they fulfill this requirement. The minimum grade required for the successful completion of Part 2 (excluding advanced research) is at least a B (3.000) average for the Part 2 courses. The Part 2 courses, including any makeup of grade-point-average deficiencies (see following), must be completed within two calendar years of passing the qualifying exam. The department expects students to complete the bulk of these courses in the first year after the qualifying exam. The cumulative average will be calculated each semester. No more than two courses or 8 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirement for the PhD degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee. Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. In calculating the overall cumulative average, all graduate-level course work completed at the time of clearance for graduation will be counted.

## **Qualifying Exam Requirement**

A student who fails to achieve the required B average for the Part 1 courses must petition the graduate committee in order to remain in the graduate program and be eligible to take the qualifying exam. A student who fails to achieve the required B average for the Part 2 courses must petition the graduate committee in order to remain in the graduate program. All students registered in the PhD program are required to pass a qualifying exam unless they are granted an exemption (see below). The qualifying exam may include both written and oral parts.

The qualifying exam consists of two parts:

- **Part 1:** Classical physics (based on classical mechanics and mathematical methods), electromagnetic theory, and statistical physics.
- **Part 2:** Quantum physics (based on quantum mechanics and its applications) and statistical physics. The content of the qualifying exam will be based on the content of the first-year courses, excluding Principles of Experimental Physics (PHYS 5318). A syllabus is available and on request will be distributed by the graduate coordinator to any student prior to the exam.

The qualifying exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. The exam will consist of one day each on Part 1 (classical physics/mathematical methods, electromagnetism, and statistical physics) and Part 2 (quantum physics and statistical physics).

All students enrolled in the PhD program must take the fall qualifying exam after completing their first-year course of study with the required grade-point average unless they are granted an exemption. Students taking the exam for the first time must take both Part 1 and Part 2. A student who does not pass the exam on his or her first attempt must pass the exam the next time it is given in order to continue in the PhD program. However, a student who passes one part of the first attempt is not required to repeat that part.

Any PhD student will be exempt from taking the quantum part of the qualifying exam if they receive both a grade of B+ or higher in Quantum Theory 1 (PHYS 7315), Quantum Theory 2 (PHYS 7316), and Statistical Physics (PHYS 7305) and have a GPA of 3.670 or higher in those three courses. To meet this standard, they must take all the above courses. Any PhD student will be exempt from taking the classical part of the qualifying exam if they receive both a grade of B+ or higher in Classical Mechanics/Math Methods (PHYS 7301), Electromagnetic Theory (PHYS 7302), and Statistical Physics (PHYS 7305) and have a GPA of 3.670 or higher in these three courses. To meet this standard, they must take all three of these courses.

A student who fails the written exam by less than 5 percent of the total possible score on the second attempt for that part will be automatically given an oral exam. A student who fails the written exam by more than 10 percent is excluded from taking an oral exam. These provisions apply separately to Parts 1 and 2 of the exam.

## **PhD Candidacy**

Degree candidacy is established when the student has passed the qualifying examination and completed both the Part 1 and Part 2 course requirements. PhD candidacy may be achieved before completion of the advanced elective if the elective in the student's specialization is not offered in a given year. The elective must be taken at the next opportunity. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

## **PhD Dissertation Requirement**

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor, two full-time members of the department, and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the qualifying examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the qualifying exam.

## **PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar**

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of his or her thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

### **PhD Dissertation Defense**

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

### **PhD Specialization Options**

Students choose a specialization in biological physics; particle physics; condensed matter physics; or, with preapproval of a faculty member, in the following areas: nanomedicine or network science.

Multiple specializations are allowed if the individual requirements for each specialization are met.

Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

### **Transfer Credit**

Students must petition in writing through the graduate committee to the director of graduate student services for all transfer credit. A copy of an official transcript must be attached to the Request for Transfer Credit form. A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the PhD degree provided that the credits transferred consist of a grade of B or better; are graduate-level courses; have been earned at an accredited institution; and have not been used toward any other degree. Grades are not transferred.

### **Course Waivers**

Course waivers may be accepted toward the PhD degree course requirements, though they will not change the numbers of credits required for the program. The student must have received a B grade or better in equivalent graduate-level core courses that have been earned at an accredited institution. Students must petition in writing to the graduate committee for all course waivers and provide documentation in the form of official transcripts to support their petition.

### **Residence Requirement**

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

### **Internship Option**

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD qualifying examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

### **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### **Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Two qualifying examinations

Annual review

Candidacy

Preliminary research seminar proposal with proposed dissertation committee

Preliminary research seminar talk

Dissertation defense

**Core Requirements<sup>1</sup>**

Code	Title	Hours
<b>Principles</b>		
PHYS 5318	Principles of Experimental Physics	4
<b>Computational</b>		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4
<b>Theory</b>		
PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4
<b>Research</b>		
PHYS 7210	Introduction to Research in Physics (Take this repeatable course twice)	0
PHYS 9984	Advanced Research	1-8

**Electives**

Code	Title	Hours
Complete 8 semester hours from the following:		8
If preapproved to specialize in nanomedicine or network science, consult program director.		
PHYS 7322	Nonequilibrium Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Biological Physics 1	
<b>Specialization Elective</b>		
Choose 4 semester hours from your specialization below:		4

**PhD Specialization Options**A specialization is required.<sup>2</sup>

Note: Specialization in nanomedicine or network science requires prior approval.

Code	Title	Hours
<b>Biological Physics<sup>3</sup></b>		
PHYS 7731	Biological Physics 1	4
PHYS 7741	Biological Physics 2	4
<b>Particle Physics<sup>4</sup></b>		
PHYS 7323	Elementary Particle Physics	4
PHYS 7733	Topics: Elementary Particle Physics and Cosmology	4
<b>Condensed Matter Physics</b>		
PHYS 7324	Condensed Matter Physics	4
PHYS 7734	Topics: Condensed Matter Physics	4
<b>Nanomedicine</b>		
NNMD 5270	Foundations in Nanomedicine: Therapeutics	3
NNMD 5370	Nanomedicine Research Techniques	4
<b>Network Science</b>		
PHYS 5116	Network Science 1	4
PHYS 7335	Dynamical Processes in Complex Networks	4

**Dissertation**

Code	Title	Hours
Taken third year and beyond.		
PHYS 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	

Complete the following (repeatable) course until graduation:

PHYS 9996

Dissertation Continuation

**Program Credit/GPA Requirements**

42 total semester hours required

Minimum 3.000 GPA required

- 1 Methods for Teaching in the Introductory Physics Laboratory 1 (PHYS 7220) and Methods for Teaching Introductory Physics Laboratory 2 (PHYS 7230) are required for students awarded a Teaching Assistantship.
- 2 Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.
- 3 By approval of the graduate committee, biological physics students may substitute graduate courses in biology, physics, or chemistry from the following list instead of Biological Physics 2 (PHYS 7741):
  - Biochemistry (BIOL 6300), Molecular Cell Biology (BIOL 6301), Optical Methods of Analysis (CHEM 5613), Molecular Modeling (CHEM 5638), .
  - Additional appropriate courses may also be substituted by approval of the physics graduate committee.
- 4 Elementary Particle Physics (PHYS 7323) is required for a specialization in particle physics. The advanced elective may be Topics: Elementary Particle Physics and Cosmology (PHYS 7733).

**Plan of Study****Year 1**

Fall	Hours	Spring	Hours
PHYS 7210		0 PHYS 5318	4
PHYS 7301		4 PHYS 7210	0
PHYS 7302		4 PHYS 7305	4
PHYS 7315		4 PHYS 7316	4
		12	12

**Year 2**

Fall	Hours	Spring	Hours
PHYS 7321		4 PHYS 9984	2-8
Electives		8 Advanced elective	4
		12	6-12

**Year 3**

Fall	Hours	Spring	Hours
PHYS 9990		0 PHYS 9991	0
		0	0

**Total Hours: 42-48****Advanced Entry Program Requirements**

The Department of Physics offers a Doctor of Philosophy in Physics with specializations in different subfields that reflect the forefront of research activities of the department, including biological physics, condensed matter physics, elementary particle physics, nanomedicine, and network science. The program for the PhD degree consists of the required coursework, a qualifying examination, a preliminary research seminar, the completion of a dissertation based upon original research performed by the student, and a dissertation defense upon completion of the dissertation. Based on these measures, students are expected to obtain a graduate-level understanding of basic physics concepts and demonstrate the ability to formulate a research plan, communicate orally a research plan, and conduct and present independent research.

**Coursework**

Students entering with a master's degree from a U.S. institution in physics or a related area approved by the department will be required to take 10 semester hours of courses. The courses will be determined by the graduate director based on the student's transcripts. Students entering with a MS degree awarded by an institution outside the United States will need to consult the graduate director for a transcript evaluation to determine required coursework and course waivers.

**Grade Requirements**

The minimum grade required is a B (3.000) average. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the PhD degree requirements, may be recommended for termination at the discretion of the graduate committee.

## Qualifying Exam Requirement

All students registered in the PhD program are required to pass a qualifying exam unless they are granted an exemption. The qualifying exam may include both written and oral parts. Students who enter with a master's degree from a U.S. institution may take either the classical or the quantum exam, or both, at the first opportunity upon entering the program in the fall. In this case, the exam will count as a first attempt only if the student submits the exam to the examiner.

The qualifying exam consists of two parts:

- **Part 1:** Classical physics (based on classical mechanics and mathematical methods), electromagnetic theory, and statistical physics.
- **Part 2:** Quantum physics (based on quantum mechanics and its applications) and statistical physics. A syllabus is available and on request will be distributed by the graduate coordinator to any student prior to the exam.

The qualifying exam is given twice yearly: once prior to the start of the fall semester and again within the first two weeks of the start of the spring semester. The exam will consist of one day each on Part 1 (classical physics/mathematical methods, electromagnetism, and statistical physics) and Part 2 (quantum physics and statistical physics).

All students enrolled in the PhD program must take the fall qualifying exam after completing their first-year course of study with the required grade-point average. Students taking the exam for the first time must take both Part 1 and Part 2. A student who does not pass the exam on their first attempt must pass the exam the next time it is given in order to continue in the PhD program. However, a student who passes one part of the first attempt is not required to repeat that part.

A student who fails the written exam by less than 5% of the total possible score on the second attempt for that part will be automatically given an oral exam. A student who fails the written exam by more than 10% is excluded from taking an oral exam. These provisions apply separately to Parts 1 and 2 of the exam.

## PhD Candidacy

Degree candidacy is established when the student has passed the qualifying examination and completed 10 semester hours of courses. PhD degree candidacy is certified by the college. A maximum of five years after the establishment of doctoral degree candidacy is allowed for the completion of degree requirements.

## PhD Dissertation Requirement

All PhD students are required to complete a dissertation based upon new and original research in one of the three following options:

- In one of the current theoretical or experimental research programs in the department, under direct supervision of an advisor from the Department of Physics. A dissertation committee will be formed consisting of the advisor, two full-time members of the department, and an additional member, either from within the department or from an outside department or institution.
- In a recognized interdisciplinary field involving another research area of the university, under the direct supervision of a faculty member in that field. In this case, an interdisciplinary committee is formed under the approval of the graduate committee, consisting of the direct supervisor, a departmental advisor, one other member of the department, and an additional member of either the department or the external department.
- In an area of applied research in one of the industrial or high-technology laboratories associated with the department's industrial PhD program. The direct supervisor is associated with the institution where the research is performed. In this case, a dissertation advisory committee is established by the graduate committee, consisting of the direct supervisor, the departmental advisor, and two other members of the department.

PhD students must select their departmental advisor no later than the end of the spring semester of their second year or their second semester after having passed the qualifying examination, whichever comes first. This process should start as soon as the student has identified a field of research or has passed the qualifying exam.

## PhD Dissertation Committee, Preliminary Thesis Proposal, and Preliminary Research Seminar

By the end of the spring semester of the third year or the second semester in which the student is enrolled for PhD dissertation, whichever comes first, each PhD student must have an approved dissertation committee and thesis proposal.

The student (with the aid and approval of their thesis advisor) will submit a PhD thesis proposal to the graduate committee clearly outlining a plan to carry out new and original research in the context of previously published research in the scientific literature and also describe the methodologies to be employed. The thesis proposal is limited to 15 pages or less, including references. A proposed makeup of the dissertation committee will be submitted at the same time.

The graduate committee will evaluate the merit of the proposal and make recommendations for improvements when necessary, including any changes to the composition of the dissertation committee. No more than two submissions for a particular proposal may be made. In the case where a revised proposal does not meet a minimum academic standard that provides a basis for making such improvements, the graduate committee may instruct the student to select a different thesis topic or advisor.

After approval by the graduate committee, the proposal is circulated to the general faculty for comments. If the graduate coordinator receives any objections, the proposal will be referred back to the graduate committee for final resolution.

After the proposal and dissertation committee have been approved, the student will make a public presentation of the material in the preliminary research seminar before the dissertation committee in a format open to the full department and advertised one week in advance. The dissertation committee will then meet in closed session to evaluate the seminar. The preliminary research seminar must take place no later than the semester after the thesis proposal is approved and, normally, in the same semester.

In the event that the dissertation advisor is changed, a new committee must be formed, with the approval of the graduate committee, and a new preliminary research seminar given.

### **PhD Dissertation Defense**

The dissertation defense consists of a public presentation, followed by a question period conducted by the dissertation committee and limited to them and the department faculty. The date of the dissertation presentation must be publicized and a copy of the thesis deposited with the graduate program coordinator at least one week prior to the defense. If during this posting period or in the two business days following the defense a written objection to the thesis is lodged with the department chair by a member of the faculty, the chair may appoint an ad hoc postdefense review committee to provide advice on the scientific issues raised by the objection. Students should note that they must be registered for Dissertation or Dissertation Continuation during the semester in which they defend their dissertation and that they should schedule their defenses well in advance of the end of the semester in order to accommodate the review/waiting period and the time required to deposit the thesis.

The final dissertation defense is held in accordance with the College of Science regulations.

### **Residence Requirement**

The residence requirement is satisfied by at least one year of full-time graduate work (i.e., enrollment in PhD Dissertation, for two consecutive semesters). Students must be continually enrolled throughout the pursuit of the dissertation.

### **Internship Option**

A PhD candidate may spend one year in a participating high-technology, industrial, or government laboratory immediately after passing the PhD qualifying examination. In this program, the student is expected to remain in touch with the university by taking one course per semester at the university and by frequent contact with a faculty advisor. After the one-year paid internship, the student returns to the university to do the dissertation. Eligibility for this program is contingent on acceptance both by the department and by the external laboratory.

Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

- Two qualifying examinations
- Annual review
- Candidacy
- Preliminary research seminar proposal with proposed dissertation committee
- Preliminary research seminar talk
- Dissertation defense

### **Core Requirements**

Code	Title	Hours
	Complete 10 semester hours of coursework. The courses required will be determined by the graduate program director based on the student's transcripts. <sup>1</sup>	10

### **Dissertation**

Code	Title	Hours
PHYS 9990	Dissertation Term 1	
PHYS 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PHYS 9996	Dissertation Continuation	

### **Program Credit/GPA Requirements**

- 10 total semester hours required
- Minimum 3.000 GPA required

<sup>1</sup> Methods for Teaching in the Introductory Physics Laboratory 1 (PHYS 7220) is required for students awarded a teaching assistantship.

## Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

### Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 481)
- Electromagnetics, Plasma, and Optics (p. 482)
- Microsystems, Materials, and Devices (p. 482)

### Optional Thesis

Code	Title	Hours
	Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:	8

#### Option 1 (College of Science thesis advisor)

PHYS 7990	Thesis (completed twice over two semesters)
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#### Option 2 (College of Engineering thesis advisor)

EECE 7945	Master's Project
EECE 7990	Thesis

### Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

### ANALYSIS, MODELING, AND COMPUTATION

Code	Title	Hours
<b>Core Courses</b>		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	

EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7335	Dynamical Processes in Complex Networks	
<b>ELECTROMAGNETICS, PLASMA, AND OPTICS</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Core Courses</b>		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	
<b>MICROSYSTEMS, MATERIALS, AND DEVICES</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Core Courses</b>		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5606	Micro- and Nanofabrication	
EECE 5680	Electric Drives	
EECE 7204	Applied Probability and Stochastic Processes	
EECE 7240	Analog Integrated Circuit Design	
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication	
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7353	VLSI Design	
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering	
<b>Physics Coursework</b>		

Complete 12 semester hours from the following:

12

PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7302	Electromagnetic Theory
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7734	Topics: Condensed Matter Physics

## Complex Network Analysis, MS

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4
NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4
NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

## Concentrations

Complete one of the following concentrations:

**1000 Complex Network Analysis, MS**

- Complex Social Systems (p. 1000) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 1000) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 1000) (College of Science and Bouvé College of Health Sciences)

**Experiential Courses**

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	4
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

**Optional Co-op**

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

**Program Credit/GPA Requirements**

36–37 total semester hours required

Minimum 3.000 GPA required

**COMPLEX SOCIAL SYSTEMS CONCENTRATION**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	6-8
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**ECONOMIC AND TECHNOLOGICAL NETWORKS**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
CS 7150	Deep Learning	6-8
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**POPULATION HEALTH DYNAMICS CONCENTRATION**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
BINF 6308	Bioinformatics Computational Methods 1	6-8

NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Complete 4–6 semester hours from the following:		4-6
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

## Nanomedicine, MS

### Overview

The Master of Science in Nanomedicine is a flexible, interdisciplinary, industry-aligned professional master's degree program. It is designed for scientists, engineers, and clinicians who want to develop competencies and skills in nanomedicine research, innovation, and commercialization. Our students receive hands-on training in nanomedicine challenges and opportunities, research tools and techniques, and translation from bench to bedside. The curriculum integrates immersive experiential learning with industry co-ops to prepare graduates for high-demand research and entrepreneurship roles in biotechnology, pharmaceutical, biomedical, and healthcare industries.

This two-year, full-time master's program consists of six core courses, year-round professional seminars, and a full-time co-op experience. In year two, students tailor their curriculum by selecting one of the following concentrations (or selecting 18 semester hours of electives).

### Nanoformulation Research Concentration

The nanoformulation research concentration integrates nanoparticle design, formulation, characterization, and translation. Students gain experience in nanomedicine theory, materials and methods, advanced laboratory techniques, and state-of-the-art instrumentation through a combination of expert-led lectures, instrument demonstrations, and collaborative interdisciplinary project-based laboratory experiences. Students have an opportunity to acquire research and project management skills for roles in research, development, and manufacturing.

### Translation and Commercialization Concentration

The translation and commercialization concentration studies scientific discovery, business, and management from the perspective of delivering nanomedicine products to patients. Students build real-world knowledge and skills in innovation, business development, and regulatory affairs—from initial discovery and R&D to FDA approval and launch—through a combination of case studies, industry-mentored projects, and creation of a virtual startup company.

### Vaccine Development Concentration

Innovations in nanoparticle-based vaccine delivery during the SARS-CoV-2 pandemic have fundamentally changed the way we develop and test vaccines. The vaccine development concentration provides training in scientific, business, and regulatory principals of vaccine R&D. Students integrate molecular tools for vaccine design, knowledge of vaccine-tissue interactions, and best practices for biopharmaceutical cell culture and manufacturing to develop the industry-aligned skills needed at the forefront of vaccine development.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
BIOL 6381	Ethics in Biological Research	2
NNMD 5270	Foundations in Nanomedicine: Therapeutics	3
NNMD 5271	Foundations in Nanomedicine: Diagnostics	3
NNMD 5570	Preclinical and Clinical Study Design	3
NNMD 6272	Professional Nanomedicine Seminar	0
PHSC 5560	Nanotoxicity	3

PHSC 6214 or BIOT 6214	Experimental Design and Biostatistics Experimental Design and Biostatistics	2
<b>Co-op</b>		
Co-op may be started in the summer of Year 1, Year 2, or both.		
NNMD 6500	Professional Development for Co-op	0
NNMD 6964	Co-op Work Experience	0

## Concentrations or Electives Option

A concentration is not required. Students may complete electives (from the electives list below) in lieu of a concentration.

- Nanoformulation Research (p. 1003)
- Translation and Commercialization (p. 1003)
- Vaccine Development (p. 1003)
- Electives Option (p. 1003)

## Electives List

Code	Title	Hours
Complete electives from the following (electives not on this list may be chosen with faculty advisor approval):		
<b>Laboratory Research</b>		
BIOT 5145	Biotechnology Lab Skills	
BIOT 7245	Biotechnology Applications Laboratory	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5380	Electron Microscopy Techniques	
NNMD 6370	Nanomedicine Experiential Capstone	
NNMD 6984	Research	
PHSC 5212	Research Skills and Ethics	
<b>Nanomaterials Design and Application</b>		
BIOE 5820	Biomaterials	
BIOE 6100	Medical Physiology	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5910	Vaccines and Immunization	
BIOT 5930	Molecular Tools for Vaccine Design	
CHEM 5610	Polymer Chemistry	
CHME 5630	Biochemical Engineering	
CHME 5631	Biomaterials Principles and Applications	
CHEM 5640	Biopolymeric Materials	
CHME 5683	Introduction to Polymer Science	
PHSC 6216	Human Physiology and Pathophysiology	
PHSC 6290	Biophysical Methods in Drug Discovery	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 7731	Biological Physics 1	
<b>Drug Delivery</b>		
CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics	
CHME 5160	Drug Delivery: Engineering Analysis	
CHME 7350	Transport Phenomena	
PMST 6252	Pharmacokinetics and Drug Metabolism	
PMST 6254	Advanced Drug Delivery Systems	
<b>Commercialization and Regulatory Affairs</b>		
BIOT 5219	The Biotechnology Enterprise	
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future	
BIOT 5225	Managing and Leading a Biotechnology Company	
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship	
BIOT 5920	Foundations in Vaccine Regulatory Science	
BIOT 6290	Foundation in Quality for Biotechnology	

BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
CHME 5631	Biomaterials Principles and Applications
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

### Program Credit/GPA Requirements

34 total semester hours required

Minimum 3.000 GPA required

### NANOFORMULATION RESEARCH CONCENTRATION

Code	Title	Hours
BIOE 5820 or CHME 5631	Biomaterials Biomaterials Principles and Applications	4
CHEM 5648 or PMST 6252	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics Pharmacokinetics and Drug Metabolism	3
NNMD 5370	Nanomedicine Research Techniques	4
NNMD 6370	Nanomedicine Experiential Capstone (Nanomedicine Experiential Capstone)	4
Electives (see electives course list)		3

### TRANSLATION AND COMMERCIALIZATION CONCENTRATION

Code	Title	Hours
BIOT 5145 or BIOT 5220	Biotechnology Lab Skills The Role of Patents in the Biotechnology Industry, Past and Future	1
BIOT 5219	The Biotechnology Enterprise	2
BIOT 5225	Managing and Leading a Biotechnology Company	3
BIOT 6290	Foundation in Quality for Biotechnology	3
BIOT 6310	CGMP Statutes and Regulation	3
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	3
Electives (see electives course list)		3

### VACCINE DEVELOPMENT CONCENTRATION

Code	Title	Hours
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	3
BIOT 5910	Vaccines and Immunization	3
BIOT 5920	Foundations in Vaccine Regulatory Science	3
BIOT 5930	Molecular Tools for Vaccine Design	3
BIOT 6310	CGMP Statutes and Regulation	3
Electives (see electives course list)		3

### ELECTIVES OPTION

Code	Title	Hours
NNMD 5470 or NNMD 5370	Nano/Biomedical Commercialization: Concept to Market Nanomedicine Research Techniques	3-4
Electives (see electives course list)		15

### Plan of Study

#### Sample Plans of Study

##### YEAR 1

Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOL 6381	2	NNMD 5570	3	NNMD 6964	0
NNMD 5270	3	NNMD 5271	3	(Co-op option 1: May–Aug.)	
NNMD 6500	0	NNMD 6272	0		

PHSC 5560	3 PHSC 6214	2
	8	8

Total Hours: 16

## YEAR 2 NANOFORMULATION RESEARCH CONCENTRATION

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOE 5820 or CHME 5631		4 CHEM 5648 or PMST 6252		3 NNMD 6964	0
NNMD 5370		4 NNMD 6272		0 (Co-op option 2: May–Aug.)	
NNMD 6272		0 NNMD 6370		4 (Co-op option 3: July-Dec.)	
		Elective		3	
	8			10	0

Total Hours: 18

## TRANSLATION AND COMMERCIALIZATION CONCENTRATION

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOT 5145 or 5220		1 BIOT 5120		3 NNMD 6964	0
BIOT 5219		2 BIOT 5225		3 (Co-op option 2: May–Aug.)	
BIOT 6310		3 NNMD 6272		0 (Co-op option 3: July–Dec.)	
NNMD 5470		3 Elective		3	
NNMD 6272		0			
	9			9	0

Total Hours: 18

## VACCINE DEVELOPMENT CONCENTRATION

Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
BIOT 5631		3 BIOT 5920		3 NNMD 6964	0
BIOT 5910		3 BIOT 5930		3 (Co-op option 2: May–Aug.)	
BIOT 6310		3 NNMD 6272		0 (Co-op option 3: July–Dec.)	
NNMD 6272		0 Elective		3	
	9			9	0

Total Hours: 18

## Physics, MS

The Department of Physics offers a Master of Science degree with several options. The standard physics MS can be earned by taking a specified set of courses without an MS thesis. Alternatively, an MS thesis may substitute for 8 semester hours of coursework. Both of these options may be pursued either full time or part time. Upon completion of the MS degree in physics, students should be able to apply graduate-level knowledge and solve problems in the areas of electrodynamics, quantum mechanics, classical mechanics, statistical mechanics, and advanced mathematical methods.

### Grade Requirements

To qualify for the MS degree, a cumulative average of 3.000, equivalent to a grade of B, must be obtained. No more than two courses or 6 semester hours of credit, whichever is greater, may be repeated in order to satisfy the requirements for the MS degree. A student who does not maintain a 3.000 cumulative average for two consecutive semesters, or is otherwise not making satisfactory progress toward the MS degree requirements, may be recommended for termination at the discretion of the graduate committee.

Within the above limitations, a required course for which a grade of F is received must be repeated with a grade of C or better and may be repeated only once. Elective courses in which an F has been received may be repeated once to obtain a C or better.

## Transfer Credit

Students must petition, in writing, through the graduate committee to the director of graduate student services for all transfer credit. An official transcript must be attached to the Request for Transfer Credit form. A maximum of 9 semester hours of credit obtained at another institution may be accepted toward the MS degree provided that the credits transferred consist of a grade of B or better in graduate-level courses and have not been used toward any other degree. Grades are not transferred.

## Current MS Students Interested in the PhD Program

Physics MS students interested in applying to the Physics, PhD (p. 990) program must submit a complete application for admission.

## Special Student Status

Special students are allowed to earn credit for a maximum of 12 semester hours. Students interested in taking more than 12 semester hours must make a formal application to the degree program online.

## Coursework

The MS degree requires successful completion of a minimum of 32 semester hours of coursework. There are three options for the MS degree:

The first option is the standard physics MS without an MS thesis, requiring a minimum of 32 semester hours of coursework.

The second option is the standard physics MS with an MS thesis, requiring a minimum of 1 semester hour of thesis. Up to 8 semester hours of thesis can substitute for coursework.

The third option is the physics MS with thesis and specialization in applied physics, engineering physics, biophysics, chemical physics, material physics, mathematical physics, and computational physics.

Graduate students desiring the MS with thesis option should arrange a thesis with a faculty advisor. The thesis must demonstrate the individual's capacity to execute independent work based on original material. The thesis must be approved by the graduate committee. The thesis may be completed in one semester (e.g., summer semester) or in consecutive semesters. Students who have not completed their thesis after the required number of thesis credits must register for Thesis Continuation until the thesis is approved by the graduate school and submitted electronically to Proquest.

The degree requires a minimum of 32 semester hours of graduate credit. The 32 semester hours may include up to 9 semester hours of transfer credit, as approved by the department's graduate committee and the graduate school.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Computational Coursework</b>		
PHYS 7301	Classical Mechanics/Math Methods	4
PHYS 7305	Statistical Physics	4
PHYS 7321	Computational Physics	4
<b>Theory Coursework</b>		
PHYS 7302	Electromagnetic Theory	4
PHYS 7315	Quantum Theory 1	4
PHYS 7316	Quantum Theory 2	4

## Options

- Coursework (p. 1006)
- Thesis (p. 1006)
- Thesis with specialization (p. 1006)<sup>1</sup>

**COURSEWORK OPTION**

Note: In consultation with your faculty advisor, you may choose an area of specialization from physics, engineering, chemistry, biology, mathematics, psychology, or computer science. Elective courses from the Physics, PhD (p. 990) program may substitute for these electives with advisor approval.

Code	Title	Hours
<b>Electives</b>		
Complete 8 semester hours from the following:		8
PHYS 5113	Particle Physics	
PHYS 5116	Network Science 1	
PHYS 5117	Advanced Astrophysics Topics	
PHYS 5118	General Relativity and Cosmology	
PHYS 5125	Advanced Quantum Mechanics	
PHYS 5260	Introduction to Nanoscience and Nanotechnology	
PHYS 5318	Principles of Experimental Physics	
PHYS 7322	Nonequilibrium Physics	
PHYS 7323	Elementary Particle Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7325	Quantum Field Theory 1	
PHYS 7731	Biological Physics 1	

**THESIS**

Code	Title	Hours
Complete 8 semester hours from the following:		
PHYS 7990	Thesis (In consultation with your faculty advisor, any remaining semester hours may be completed with electives.)	8

In consultation with your faculty advisor, any remaining semester hours may be completed with electives.

**THESIS WITH SPECIALIZATION<sup>1</sup>**

Applied physics, engineering physics, biophysics, chemical physics, materials physics, mathematical physics, or computational physics.

Code	Title	Hours
Complete a minimum of 12 semester hours from the following:		
PHYS 7990	Thesis (A minimum of 1 semester hour is required and up to 8 semester hours may be used toward the thesis option.)	12

Complete a minimum of 8 semester hours of specialization coursework in consultation with your faculty advisor.

**Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

<sup>1</sup> Note that the specialization will not appear on the degree diploma or on the official transcript but can be listed as the field of study on CVs and grant proposals.

**Plan of Study**

Year 1			
Fall	Hours	Spring	Hours
PHYS 7301		4 PHYS 7305	4
PHYS 7302		4 PHYS 7316	4
PHYS 7315		4 Elective (optional)	4
PHYS 7321 (can be taken year 1 or year 2)		4	
		16	12

**Year 2**

Fall	Hours
Elective or thesis	4

Additonal elective	4
	8

Total Hours: 36

## Nanomedicine, Graduate Certificate

The Graduate Certificate in Nanomedicine is a part-time program designed to introduce scientists, engineers, and physicians to interdisciplinary problem solving in nanomedicine. This experiential learning program is ideal for individuals seeking careers in biotechnology, pharmaceutical, biomedical, or clinical fields. Students study both fundamental and applied aspects of nanomedicine and then apply this knowledge to designing strategies for nanomedicine innovation, translation, and commercialization. The graduate certificate consists of 8 semester hours of NNMD coursework and one elective, totaling 12 semester hours.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Core</b>		
NNMD 5270 or NNMD 5271	Foundations in Nanomedicine: Therapeutics Foundations in Nanomedicine: Diagnostics	3
Complete at least 5 semester hours from the following:		
NNMD 5272	Nanomedicine Seminar (may be repeated)	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market	
NNMD 5570	Preclinical and Clinical Study Design	

### Electives

Code	Title	Hours
Complete 4 semester hours of electives from the following list. Electives not on this list may be chosen with faculty advisor approval.		
<i>Laboratory Research</i>		
BIOL 6381	Ethics in Biological Research	
BIOT 5145	Biotechnology Lab Skills	
BIOT 7245	Biotechnology Applications Laboratory	
NNMD 5370	Nanomedicine Research Techniques	
NNMD 5380	Electron Microscopy Techniques	
NNMD 5570	Preclinical and Clinical Study Design	
NNMD 6984	Research	
PHSC 5212	Research Skills and Ethics	
PHSC 6214	Experimental Design and Biostatistics	
<i>Nanomaterials Design and Application</i>		
BIOE 5820	Biomaterials	
BIOE 6100	Medical Physiology	
BIOT 5631	Cell Culture Processes for Biopharmaceutical Production	
BIOT 5700	Molecular Interactions of Proteins in Biopharmaceutical Formulations	
BIOT 5910	Vaccines and Immunization	
BIOT 5930	Molecular Tools for Vaccine Design	
CHEM 5610	Polymer Chemistry	

CHEM 5640	Biopolymeric Materials
CHME 5630	Biochemical Engineering
CHME 5631	Biomaterials Principles and Applications
CHME 5683	Introduction to Polymer Science
NNMD 5270	Foundations in Nanomedicine: Therapeutics
NNMD 5271	Foundations in Nanomedicine: Diagnostics
PHSC 6216	Human Physiology and Pathophysiology
PHSC 6290	Biophysical Methods in Drug Discovery
PHYS 5260	Introduction to Nanoscience and Nanotechnology
PHYS 7731	Biological Physics 1
<b>Drug Delivery</b>	
CHEM 5648	Chemical Principles and Application of Drug Metabolism and Pharmacokinetics
CHME 5160	Drug Delivery: Engineering Analysis
CHME 7350	Transport Phenomena
PHSC 5560	Nanotoxicity
PMST 6252	Pharmacokinetics and Drug Metabolism
PMST 6254	Advanced Drug Delivery Systems
<b>Commercialization and Regulatory Affairs</b>	
BIOT 5219	The Biotechnology Enterprise
BIOT 5220	The Role of Patents in the Biotechnology Industry, Past and Future
BIOT 5225	Managing and Leading a Biotechnology Company
BIOT 5227	Launching Your Science: Biotechnology Entrepreneurship
BIOT 5920	Foundations in Vaccine Regulatory Science
BIOT 6290	Foundation in Quality for Biotechnology
BIOT 6310	CGMP Statutes and Regulation
BIOT 6320	Design and Development of Biopharmaceuticals
BIOT 6340	Sterile Manufacturing Operations
NNMD 5470	Nano/Biomedical Commercialization: Concept to Market

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Psychology

Website (<https://cos.northeastern.edu/psychology/>)

### Peter Bex, PhD

Professor and Chair

617.373.3076

617.373.8714 (fax)

The doctoral program in the Department of Psychology offers a research-intensive environment within a supportive community of faculty and students. Its areas of research specialization include behavioral neuroscience, cognition/cognitive neuroscience, perception, and social/personality—with crosscutting themes in health, affective science, and life span development.

During the program, students complete a series of topical seminars and courses in quantitative analysis while gaining research skills through working closely with their advisors. They are also expected to develop their own research program, beginning with their master's thesis and culminating in their dissertation. Students' professional development is supported by attending colloquia, serving as teaching assistants, and modest annual stipends for research/travel.

## Programs

### Doctor of Philosophy (PhD)

- Human Behavior and Sustainability Sciences (p. 964)
- Psychology (p. 1011)

## Human Behavior and Sustainability Sciences, PhD

### Overview

The persistent failure to integrate the social, behavioral, and cognitive sciences with ecological and geophysical sciences is a critical friction point reducing the viability and effectiveness of sustainability solutions. Therefore, a degree program that combines training in psychology with the ecological and geophysical sciences will produce boundary-breaking scholars who can accelerate sustainability solutions that are robustly informed by the results of scientific research. The proposed curriculum integrates degree requirements from existing PhD programs in psychology and marine and environmental sciences (sustainability sciences concentration), with the addition of a set of specialized core courses and integrated cross-disciplinary research training. It also allows students broad latitude in designing their specialty within the parameters of the program.

The PhD in Human Behavior and Sustainability Sciences program provides students with the following advanced coursework and training. Students must pass two examinations during the course of their graduate studies to achieve candidacy:

1. A qualifying paper that the student will write and present to their dissertation committee.
2. A proposal defense presented to the student's dissertation committee that explains the research areas that the student proposes to work in.

At the end of the program, students will defend their written dissertation, which consists of a public seminar, public question-and-answer period, and private defense of their work to their dissertation committee. Dissertation committees consist of at least four Northeastern University faculty and one external faculty member.

A cumulative grade-point average of 3.000 is required for graduation. The PhD will be awarded following submission of a dissertation, approved by the candidate's dissertation committee, to the College of Science.

### Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review  
 Dissertation committee  
 Qualifying paper and presentation  
 Dissertation proposal and presentation  
 Candidacy  
 Dissertation/dissertation defense  
 Teaching experience

### Core Requirements

Code	Title	Hours
EEMB 7103	Seminar in Sustainability Sciences	2
EEMB 8103	Readings in Sustainability Sciences	2
ENVR 5450	Applied Social-Ecological Systems Modeling	4
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
PSYC 7210	Seminar in Cognition	3

### Research

Code	Title	Hours
Complete two semesters from the following:		
PSYC 8401	Research Project	6
or EEMB 8984	Research	

**Electives**

Code	Title	Hours
Complete 8 semester hours from the following:		
<b>Psychology Breadth Courses</b>		
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Cognitive Science	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5170	Social and Affective Science	
<b>Sustainability Breadth Courses</b>		
EEMB 5130	Population Dynamics	
EEMB 5506	Biology and Ecology of Fishes	
EEMB 5518	Ocean and Coastal Processes	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5115	Advanced Topics in Environmental Geology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5260	Geographical Information Systems	
ENVR 5350	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5700	Streams and Watershed Ecology	
ENVR 5750	Urban Ecology	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	
ENVR 6150	Food Security and Sustainability	
ENVR 6500 and ENVR 6501	Biostatistics and Lab for ENVR 6500	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 6300	Research Methods in the Social Sciences	
INSH 6406	Analyzing Complex Digitized Data	
INTL 5100	Climate and Development	
PHTH 5214	Environmental Health	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5267	Climate Policy and Justice	
PPUA 5268	International Environmental Policy	
<b>Psychology Depth Courses</b>		
PSYC 7210	Seminar in Cognition	
PSYC 7250	Seminar in Clinical Neuroscience	
PSYC 7300	Advanced Quantitative Analysis	
<b>Sustainability Depth Courses</b>		
EEMB 7101	Seminar in Marine Sciences	
EEMB 7102	Seminar in Ecology and Evolutionary Biology	
EEMB 7103	Seminar in Sustainability Sciences	
EEMB 7104	Seminar in Geosciences	
ENVR 6102	Environmental Science and Policy Seminar 2	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7334	Social Networks	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 7346	Resilient Cities	
SOCL 7267	Environment, Health, and Society	

## Dissertation

Code	Title	Hours
Please enroll in either EEMB 9990 or PSYC 9990 for one semester after achieving candidacy. In the following semester, please enroll in either EEMB 9991 or PSYC 9991.		
EEMB 9990 or PSYC 9990	Dissertation Term 1	
EEMB 9991 or PSYC 9991	Dissertation Term 2	
	Dissertation Term 2	

## Program Credit/GPA Requirements

31 total semester hours required

Minimum 3.000 GPA required

## Psychology, PhD

The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. The program offers experimental emphasis and coursework in behavioral and developmental neuroscience, cognitive science, sensation and perception, and social/affective science. The program does not offer training in clinical or counseling psychology. The objective of the PhD program is to prepare students to become experts in research and teaching in psychology. To accomplish this goal, the department takes a mentoring approach whereby the graduate students are apprentices in faculty laboratories, working closely with their faculty mentors throughout their time in the program. The basic apprenticeship relationship is supplemented by other activities, such as required courses (concentrated in the first and second years), advanced seminars and/or course work in this as well as other departments or universities, a colloquium series, assignments as teaching assistants, the master's project, and the dissertation and its oral defense. After the first year, the structure of the doctoral program, including course work, is flexible and assumes that the process of learning and scientific discovery must be individualized. Graduate students also have an opportunity to develop their teaching and research skills through close mentoring of undergraduate research assistants. The PhD program is a five-year, twelve-months-per-year program.

The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

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*Students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS Psychology (<https://catalog.northeastern.edu/graduate/science/psychology/psychology-ms/>) degree. Note that no students will be admitted directly into the Psychology program to pursue a master's degree.*

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

First-year paper  
Master's proposal  
Master's paper  
Master's presentation  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation  
Dissertation defense

1012 Psychology, PhD

At least two assigned courses as teaching assistant

## Core Requirements

All graduate courses within the Department of Psychology are graded S/U. A grade of S is required in each psychology department course.

Code	Title	Hours
<b>Fundamentals</b>		
Complete the following:		
PSYC 5110	Cognitive Science	3
PSYC 5170	Social and Affective Science	3
Complete one of the following:		
PSYC 5115	Colloquium	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
<b>Research Dissemination</b>		
PSYC 5301	Research Methods in Psychological Sciences	3
<b>Quantitative Methods</b>		
PSYC 5180	Quantitative Methods 1	3
PSYC 5181	Quantitative Methods 2	3
<b>Ethics</b>		
PSYC 7302	Ethics and Professional Issues	3
<b>Project</b>		
Take the following (repeatable) course three times:		
PSYC 8401	Research Project	
<b>Thesis</b>		
Take the following (repeatable) course twice:		
PSYC 7990	Thesis	

## Electives

Code	Title	Hours
Complete 14 semester hours from the following:		
Note: Proseminars not taken to fulfill core requirements and courses outside the department may be taken if approved by faculty adviser and Director of Graduate Studies.		
PSYC 7200 to PSYC 7300		
PSYC 5100	Proseminar in Psycholinguistics	
PSYC 5110	Cognitive Science	
PSYC 5115	Colloquium	
PSYC 5120	Proseminar in Sensation	
PSYC 5130	Proseminar in Perception	
PSYC 5140	Proseminar in Biology of Behavior	
PSYC 5150	Proseminar in Clinical Neuroscience	
PSYC 5170	Social and Affective Science	
PSYC 8402	Special Topics in Psychology	

## Dissertation

Code	Title	Hours
PSYC 9990	Dissertation Term 1	
PSYC 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

50 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

Year 1					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Complete the following:		Complete the following:		PSYC 8401	3
PSYC 5110	3	PSYC 5170	3	Elective	3
PSYC 5180	3	PSYC 5181	3	Elective	2-3
PSYC 8401	3	PSYC 8401	3		
		Complete one of the following:		3	
		PSYC 5120			
		PSYC 5130			
		PSYC 5140			
		PSYC 5150			
		PSYC 5115			
	9			12	
					8-9
Year 2					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
Elective		3 Elective		3 PSYC 7302	3
Complete the following:		Complete the following:		PSYC 7996	0
PSYC 7990	3	PSYC 7990	3	Elective	3
PSYC 5301	3				
	9			6	
					6
Year 3					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9990	0	PSYC 9991		0 PSYC 9996	0
	0			0	
					0
Year 4					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996	0	PSYC 9996		0 PSYC 9996	0
	0			0	
					0
Year 5					
Fall	Hours	Spring	Hours	Summer Full Semester	Hours
PSYC 9996	0	PSYC 9996		0 PSYC 9996	0
	0			0	
					0

Total Hours: 50-51

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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The PhD program in the Department of Psychology covers a wide spectrum of contemporary behavioral science within a close-knit community of faculty and students. Advanced Entry is for students who enter possessing a master's degree in psychology or another acceptable field. The program offers four overlapping areas of experimental emphasis: behavioral neuroscience, cognition, perception, and social/personality. The program does not offer training in clinical or counseling psychology. The objective of the PhD program is to prepare students to become experts in research and teaching in psychology. To accomplish this goal, the department takes a mentoring approach whereby the graduate students are apprentices in faculty laboratories, working closely with their faculty mentors throughout their time in the program. The basic apprenticeship relationship is supplemented by other activities, such as required courses (concentrated in the first and second years), advanced seminars and/or course work in this as well as other departments or universities, a colloquium series, assignments as teaching assistants, the master's project, and the dissertation and its oral defense.

After the first year, the structure of the doctoral program, including course work, is flexible and assumes that the process of learning and scientific discovery must be individualized. Graduate students also have an opportunity to develop their teaching and research skills through close mentoring of undergraduate research assistants. The PhD program is a five-year, 12-months-per-year program.

For students who enter the program with a suitable master's degree, degree candidacy is established through completion of a set of requirements determined on an individual basis. An additional 20 semester hours beyond the master's degree are required for the PhD degree. The dissertation committee must include at least three tenured or tenure-track faculty members from within the psychology department—two from the student's interest area and one from another area. The oral defense committee consists of the dissertation committee plus additional tenured and tenure-track faculty members from the psychology department.

Complete all courses and requirements listed below unless otherwise indicated. Individual programs of study will be tailored to acknowledge students' previous coursework.

## Milestones

Master's presentation  
Annual review  
Dissertation committee  
Dissertation proposal  
Dissertation  
Dissertation defense  
At least two assigned courses as teaching assistant

## Core Requirements

A grade of S is required in each psychology department course.

Code	Title	Hours
Consult your faculty adviser and director of graduate studies for acceptable coursework.		10

## Electives

Code	Title	Hours
Consult your faculty adviser and graduate director for acceptable electives.		10

## Dissertation

Code	Title	Hours
PSYC 9990	Dissertation Term 1	
PSYC 9991	Dissertation Term 2	
Complete the following (repeatable) course until graduation:		
PSYC 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

20 total semester hours required

Minimum 3.000 GPA required

*Note:* The number of semester hours to complete this program may be more than 20. The number of semester hours and the specific required courses will be determined by a review of previous coursework by the graduate director and faculty adviser.

## Cross-Disciplinary Science PhD

The Cross-Disciplinary Science PhD provides a framework for housing a series of combined PhD programs representing research evolution into cutting-edge areas that cross disciplinary boundaries driven by the demands of current world challenges. The rapid pace of research in these areas requires efficient development of new combined PhD programs, which draw on expertise from different disciplines, and can be developed efficiently under the common framework of the Cross-Disciplinary Science PhD. This framework provides the flexibility for PhD programs that reflect the multidisciplinary nature of the research performed by faculty and students interested in solving challenging problems through cross-disciplinary approaches.

## Programs

- PhD in Human Behavior and Sustainability Sciences (p. 964)

## Interdisciplinary Programs

### Programs

#### Doctor of Philosophy

- Network Science (p. 344)

#### Master of Science

- Applied Physics and Engineering (p. 480)
- Climate Science and Engineering (p. 446)
- Complex Network Analysis (p. 999)
- Environmental Science and Policy (p. 968)
- Statistics (p. 983)
- Statistics—Connect (p. 985)

### Network Science, PhD

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing various fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This doctoral program trains students in network science across several colleges—the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. See other collaborating colleges' catalog sections for possible elective courses.

Coursework depends on a student's area of research and is subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 semester hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

### Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of the program's first and second years. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

Each student will have a primary dissertation advisor from the network science doctoral program faculty. The dissertation advisor should be selected by the end of the program's second year's spring semester.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty.

### Alternate Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is mandatory for students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

### Qualifying Examination

The qualification exam is an oral examination of the material covered in the core curriculum. The exam will be an hour long and consist of questions selected by network science faculty. Students will receive between 50 to 80 questions to review for one month before the exam—a subset of which will make up the exam.

All students are required to sit for the exam in the fall, typically in their third year of the PhD program. Students who fail to pass the qualifying exam on their first attempt are expected to retake it in the spring term.

Students following the alternate path may take the exam at the end of the first academic year, upon completion of the required core courses.

Students may only take the qualifying exam twice.

### Dissertation Proposal

Students must submit a written dissertation proposal to the dissertation committee. The proposal should identify relevant literature, the research problem, plan, and the potential impact on the field. The proposal will be presented in an open forum before a public audience and the dissertation committee, followed by questions from noncommittee members. The written proposal must be given to committee members at least two weeks

before the oral presentation. After the presentation, the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation. The comprehensive exam must precede the final dissertation defense by at least one year.

Students may repeat the comprehensive examination once if they are unsuccessful.

## Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## Dissertation Defense

A PhD student must complete and defend a dissertation involving original network science research. The dissertation defense must adhere to the dissertation policies of the College of Social Science and Humanities (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>).

*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.*

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying exam  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4
NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

## Specializations

Complete 20 additional semester hours in one of the following specializations or another course of study with written approval from your advisor.

- Computer Science (p. 345)
- Epidemiology (p. 346)
- Math (p. 346)
- Physics/Theory (p. 346)
- Social Science (p. 346)
- Independent (p. 346)

**COMPUTER SCIENCE SPECIALIZATION**

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140 or CS 6220	Machine Learning Data Mining Techniques	4

**EPIDEMIOLOGY SPECIALIZATION**

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

**MATH SPECIALIZATION**

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4

**PHYSICS/THEORY SPECIALIZATION**

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7321	Computational Physics	4

**SOCIAL SCIENCE SPECIALIZATION**

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4

**INDEPENDENT SPECIALIZATION**

Code	Title	Hours
Students must choose two courses related to their research area with approval from their advisor.		

**ELECTIVES LIST**

Code	Title	Hours
Select from the list below to complete the remaining 12–14 semester hours for the coursework requirement. Courses outside this list may be approved by the student's advisor.		
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	
NETS 7976	Directed Study	
NETS 7983	Topics	
PHYS 7305	Statistical Physics	
PHYS 7321	Computational Physics	

**Dissertation**

Code	Title	Hours
<i>Precandidacy</i>		
NETS 8986	Research	
Students should register for NETS 8986 between completion of the qualification exam and proposal defense.		
<i>Dissertation</i>		
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	

**Dissertation Continuation**

Following completion of NETS 9990 and 9991, registration in the following is required each semester until the dissertation is completed:

NETS 9996

Dissertation Continuation

**Program Credit/GPA Requirements**

40 total semester hours required

Minimum 3.000 GPA required

**Plan of Study****Typical Plan of Study****Year 1**

Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Two specialization courses		8 NETS 7334	4
		One elective course	4
		12	12

**Year 2**

Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8

**Year 3**

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0

**Year 4**

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0

**Year 5**

Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

**Total Hours: 40****Alternate Plan of Study****Year 1**

Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4
One elective course		4 NETS 7335	4
		12	12

**Year 2**

Fall	Hours	Spring	Hours
Two specialization courses		8 Two elective courses	8
		8	8

**Year 3**

Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0

<b>Year 4</b>			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
<b>Year 5</b>			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

**Total Hours: 40**

## Applied Physics and Engineering, MS

The combined MS program in applied physics and engineering allows graduate students to receive training in one of three concentrations of the electrical and computer engineering department while also receiving fundamental graduate-level physics training that is relevant to that area.

### Thesis Option

Students may register for an additional two semesters of thesis work. Depending on the affiliation of the thesis advisor, students may register for Thesis (PHYS 7990) for a total of 8 semester hours or 4 semester hours of Master's Project (EECE 7945) followed by 4 semester hours of Thesis (EECE 7990). Thesis credits cannot be substituted for any of the coursework listed above. This option requires a total of 40 semester hours for the master's degree. A thesis committee is composed of an advisor and two faculty members from physics or electrical engineering.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Concentrations

Complete one of the following concentrations:

- Analysis, Modeling, and Computation (p. 481)
- Electromagnetics, Plasma, and Optics (p. 482)
- Microsystems, Materials, and Devices (p. 482)

### Optional Thesis

Code	Title	Hours
Select one of the following options based on the college affiliation of the thesis advisor. Thesis coursework will not be applied to other requirements of this degree program. Completion of this thesis option requires a total of 40 semester hours to earn the degree:		

#### Option 1 (College of Science thesis advisor)

PHYS 7990	Thesis (completed twice over two semesters)
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#### Option 2 (College of Engineering thesis advisor)

EECE 7945	Master's Project
EECE 7990	Thesis

### Program Credit/GPA Requirements

32 total semester hours required (40 with optional thesis)

Minimum 3.000 GPA required

**ANALYSIS, MODELING, AND COMPUTATION**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7205	Fundamentals of Computer Engineering	4
PHYS 7321	Computational Physics	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5639	Computer Vision	
EECE 5640	High-Performance Computing	
EECE 5642	Data Visualization	
EECE 5643	Simulation and Performance Evaluation	
EECE 5644	Introduction to Machine Learning and Pattern Recognition	
EECE 7205	Fundamentals of Computer Engineering	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7352	Computer Architecture	
EECE 7353	VLSI Design	
EECE 7374	Fundamentals of Computer Networks	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5116	Network Science 1	
PHYS 5318	Principles of Experimental Physics	
PHYS 7301	Classical Mechanics/Math Methods	
PHYS 7305	Statistical Physics	
PHYS 7335	Dynamical Processes in Complex Networks	

**ELECTROMAGNETICS, PLASMA, AND OPTICS**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7203	Complex Variable Theory and Differential Equations	4
PHYS 7302	Electromagnetic Theory	4
<b>Engineering Coursework</b>		
Complete 12 semester hours from the following:		12
EECE 5698	Special Topics in Electrical and Computer Engineering (Subsurface Imaging)	
EECE 7105	Optics for Engineers	
EECE 7202	Electromagnetic Theory 1	
EECE 7245	Microwave Circuit Design for Wireless Communication	
EECE 7270	Electromagnetic Theory 2	
EECE 7271	Computational Methods in Electromagnetics	
EECE 7275	Antennas and Radiation	
EECE 7293	Modern Imaging	
<b>Physics Coursework</b>		
Complete 12 semester hours from the following:		12
PHYS 5318	Principles of Experimental Physics	
PHYS 7305	Statistical Physics	
PHYS 7315	Quantum Theory 1	
PHYS 7316	Quantum Theory 2	
PHYS 7321	Computational Physics	
PHYS 7324	Condensed Matter Physics	
PHYS 7731	Biological Physics 1	

**MICROSYSTEMS, MATERIALS, AND DEVICES**

Code	Title	Hours
<b>Core Courses</b>		
EECE 7201	Solid State Devices	4
PHYS 7324	Condensed Matter Physics	4

**Engineering Coursework**

Complete 12 semester hours from the following:

12

EECE 5606	Micro- and Nanofabrication
EECE 5680	Electric Drives
EECE 7204	Applied Probability and Stochastic Processes
EECE 7240	Analog Integrated Circuit Design
EECE 7242	Integrated Circuits for Mixed Signals and Data Communication
EECE 7244	Introduction to Microelectromechanical Systems (MEMS)
EECE 7245	Microwave Circuit Design for Wireless Communication
EECE 7353	VLSI Design
EECE 7398	Advanced Special Topics in Electrical and Computer Engineering

**Physics Coursework**

Complete 12 semester hours from the following:

12

PHYS 5318	Principles of Experimental Physics
PHYS 7301	Classical Mechanics/Math Methods
PHYS 7302	Electromagnetic Theory
PHYS 7305	Statistical Physics
PHYS 7315	Quantum Theory 1
PHYS 7316	Quantum Theory 2
PHYS 7321	Computational Physics
PHYS 7734	Topics: Condensed Matter Physics

**Climate Science and Engineering, MS****Overview**

The Master of Science in Climate Science and Engineering is offered jointly by the College of Engineering and the College of Science. The program provides training in the fundamental scientific processes that underpin the structure and dynamics of the climate, as well as the engineering strategies and technologies required for decarbonization and adaptation to climate change.

Incoming students will typically hold a bachelor's degree in a science, engineering, or related field. The program is designed to prepare students for climate-facing positions in the public or private sectors and can serve as a springboard for students interested in pursuing doctoral-level research. Students must take at least 12 semester hours of College of Science courses and at least 12 semester hours of College of Engineering courses and includes a report, thesis, or coursework option.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated. In order to ensure a balance of training across science and engineering, students must take at least 12 semester hours of College of Science courses (starting with EEMB, ENVR) and at least 12 semester hours of College of Engineering courses (starting with CIVE, EECE, ENSY, MATL, ME, SBSY) from the core requirements and restricted elective course options.

## Core Requirements

Code	Title	Hours
Complete 20 semester hours from the core requirements listed below; any core course not used to meet this core course requirement can be taken as a restricted elective:		20
CIVE 5150 or ENVR 5150	Climate and Atmospheric Change	
CIVE 5275	Climate and Atmospheric Change	
CIVE 5281	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Coastal Dynamics and Design	
CIVE 5365	Climate Science, Engineering Adaptation, and Policy	
CIVE 5366	Climate Technologies for Decarbonization, Mitigation, and Adaptation	
CIVE 5670 or ENVR 5670	Air Quality Engineering and Science	
CIVE 7110	Global Biogeochemistry	
ENVR 5350	Global Biogeochemistry	
ENVR 5600	Critical Infrastructure Resilience	
ENVR 5800	Sustainable Energy and Climate Solutions	
ENVR 5600	Coastal Processes, Adaptation, and Resilience	
ENVR 5800	Climate Adaptation and Nature-Based Solutions	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the restricted electives course list below.		12

### REPORT OPTION

Code	Title	Hours
CIVE 7945 or EEMB 8984	Master's Project	4
EEMB 8984	Research	

Complete 8 semester hours from the restricted electives course list below.

8

### THESIS OPTION

Code	Title	Hours
Complete CIVE 7945 and CIVE 7990 for 8 semester hours or complete EEMB 8984 twice for 8 semester hours:		8
CIVE 7945 and CIVE 7990	Master's Project and Thesis	
EEMB 8984	Research (Completed twice)	

Complete 4 semester hours from the restricted electives course list below.

4

In addition to completing the thesis course, College of Engineering students must successfully complete the thesis submission process, including securing committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS thesis to ProQuest.

## Restricted Electives

Code	Title	Hours
CIVE 5280	Remote Sensing of the Environment	
CIVE 7100	Time Series and Geospatial Data Sciences	
CIVE 7282	Coastal and Hydraulic Modeling	
CIVE 7385	Public Transportation	
CIVE 7392	Special Topics in Environmental Engineering	
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage	
ENSY 5000	Fundamentals of Energy System Integration	
ENSY 5100	Hydropower	
ENSY 5200	Energy Storage Systems	
ENSY 5300	Electrochemical Energy Storage	
ENSY 5500	Smart Grid	
ENSY 5585	Wind Energy Systems	
ENVR 5210	Environmental Planning	

ENVR 5220	Ecosystem-Based Management
ENVR 5563	Advanced Spatial Analysis
INTL 5100	Climate and Development
LAW 7634	Energy Law and Policy
LPSC 7312	Cities, Sustainability, and Climate Change
MATL 6270	Principles, Devices, and Materials for Energy Storage and Energy Harvesting
ME 5685	Solar Thermal Engineering
PPUA 5238	Climate Change and Global Urbanization
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5268	International Environmental Policy
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings

## Program Credit/GPA Requirements

32 total semester hours required

Minimum 3.000 GPA required

### Complex Network Analysis, MS

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Required Courses

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4

NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4
NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

## Concentrations

Complete one of the following concentrations:

- Complex Social Systems (p. 1000) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 1000) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 1000) (College of Science and Bouvé College of Health Sciences)

## Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

## Optional Co-op

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

## Program Credit/GPA Requirements

36–37 total semester hours required

Minimum 3.000 GPA required

### COMPLEX SOCIAL SYSTEMS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

### ECONOMIC AND TECHNOLOGICAL NETWORKS

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
CS 7150	Deep Learning	
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6

NETS 6063	Probabilistic Mathematics of Networks
NETS 6099	Special Topics in Complex Networks

### POPULATION HEALTH DYNAMICS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
BINF 6308	Bioinformatics Computational Methods 1	6-8
NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

## Environmental Science and Policy, MS

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Seminars</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
<b>Skills Courses</b>		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List		8
and one course from the College of Social Sciences and Humanities Skills Course List.		
<i>College of Science Skills Course List</i>		
EEMB 5130	Population Dynamics	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 6500	Biostatistics	
<i>College of Social Sciences and Humanities Skills Course List</i>		
INSH 5301	Introduction to Computational Statistics	

INSH 6300	Research Methods in the Social Sciences
INSH 7400	Quantitative Analysis
LPSG 7311	Strategizing Public Policy
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6505	Public Budgeting and Financial Management
PPUA 6506	Techniques of Policy Analysis
PPUA 6509	Techniques of Program Evaluation
PPUA 6525	Institutions and Public Policy
PPUA 7237	Advanced Spatial Analysis of Urban Systems

## Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one course from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

### COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

### COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSG 7311	Strategizing Public Policy	
LPSG 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5100 - PPUA 7346		
SOCL 7267	Environment, Health, and Society	

## Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

## Statistics, MS

The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The Master of Science in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical machine learning—Khoury College of Computer Sciences
- Statistical theory and modeling—College of Science

Students will follow all policies associated with their home college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

### Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 985) (Bouvé College of Health Sciences)
- Statistical Machine Learning (p. 985) (Khoury College of Computer Sciences)
- Statistical Theory and Modeling (p. 985) (College of Science)

### Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses may be repeated):		2
MATH 6910	Master's Project	
PHTH 6880	Statistical Consultancy	

### Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	0
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	0

### Program Credit/GPA Requirements

31–32 total semester hours required

Minimum 3.000 GPA required

**BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)**

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	
PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		
MATH 7339	Machine Learning and Statistical Learning Theory 2	12
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Statistics, MS—Connect**

The Master of Science in Statistics—Connect program is designed for students from all backgrounds with a BS/BA degree, provided the student has experience with basic calculus and statistics. The first semester of the degree program provides students with the foundational knowledge needed to study successfully alongside direct-entry graduate students. The field of statistics plays a critical role in the support of nearly every industry including technology; business, management, and finance; healthcare and pharmaceuticals; and more. The MS in Statistics develops a comprehensive and flexible skill set that allows graduates to adapt to an ever-changing job market in various occupations and industries. In an era of increasing automation of Big Data, the value of the rigor of statistical thinking and analysis by individuals grows with the rise of automated Big Data analysis (e.g., artificial intelligence and machine learning). This program in statistics is designed to provide learners with a solid foundation in applied, modern, and computational approaches to statistical analysis and exposure to the statistical thinking skills necessary to critically assess data and answer business and research questions across domains. Core courses integrate theory and application, enabling students to be ready for the job on day one. Upon application, each student selects an industry concentration (biostatistics, statistical machine learning, and statistical theory and modeling) to examine statistical theories and applied methodologies most relevant to specific career pathways. In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Biostatistics—Bouvé College of Health Sciences
- Statistical Machine Learning—Khoury College of Computer Sciences
- Statistical Theory and Modeling—College of Science

Students will follow all policies associated with their college. Each student finishes the program with experiential courses such as a thesis, capstone, or consulting project, where they gain hands-on, project-based experience addressing business problems and presenting and communicating the findings and recommendations.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
-

Complete all courses and requirements listed below unless otherwise indicated.

## Connect Courses

Code	Title	Hours
Students are required to complete 8–10 semester hours from the following unless otherwise determined by the program:		
CS 5001	Intensive Foundations of Computer Science	8-10
MATH 5001	Accelerated Linear Algebra	
MATH 5002	Accelerated Multivariable Calculus	
MATH 5003	Accelerated Probability and Statistics	
MATH 5110	Applied Linear Algebra and Matrix Analysis	

## Required Courses

Code	Title	Hours
MATH 5010	Foundations of Statistical Theory and Probability	4
MATH 6241	Stochastic Processes	2
MATH 6243	Statistical Learning	4
PHTH 6800 or PHTH 6801	Causal Inference in Public Health Research Causal Inference 1	3-4
PHTH 6830	Generalized Linear Models	4

## Concentrations

Complete one of the following concentrations:

- Biostatistics (p. 986) (Bouvé College of Health Sciences (<http://northeastern.edu/bouve/>))
- Statistical Machine Learning (p. 987) (Khoury College of Computer Sciences (<https://khoury.northeastern.edu/>))
- Statistical Theory and Modeling (p. 987) (College of Science (<http://www.northeastern.edu/cos/>))

## Experiential Courses

Code	Title	Hours
Complete 2 semester hours from the following (courses can be repeated):		
MATH 6910	Master's Project	2
PHTH 6880	Statistical Consultancy	

## Co-op (Optional)

Code	Title	Hours
<b>Co-op Preparation</b>		
MATH 6000	Professional Development for Co-op	0
<b>Co-op Work Experience</b>		
<i>Statistical Machine Learning Concentration Students</i>		
Statistical machine learning students may take either course.		
<i>Biostatistics Concentration Students</i>		
HLTH 6964	Co-op Work Experience	
<i>Statistical Theory and Modeling Concentration Students</i>		
MATH 6964	Co-op Work Experience	

## Program Credit/GPA Requirements

39-41 total semester hours required

Minimum 3.000 GPA required

## BIOSTATISTICS CONCENTRATION (BOUVÉ COLLEGE OF HEALTH SCIENCES)

Code	Title	Hours
Complete 12 semester hours from the following:		
PHTH 5350	Using SAS in Public Health Research	12
PHTH 6440	Advanced Methods in Biostatistics	
PHTH 6802	Causal Inference 2	

PHTH 6810	Survival Analysis	
PHTH 6820	Design and Analysis of Clinical Trials	

**STATISTICAL MACHINE LEARNING CONCENTRATION (KHOURY COLLEGE OF COMPUTER SCIENCES)**

Code	Title	Hours
CS 5100	Foundations of Artificial Intelligence	4
CS 6140	Machine Learning	4
DS 5110	Introduction to Data Management and Processing	4

**STATISTICAL THEORY AND MODELING CONCENTRATION (COLLEGE OF SCIENCE)**

Code	Title	Hours
Complete 12 semester hours from the following:		12
MATH 7339	Machine Learning and Statistical Learning Theory 2	
MATH 7340	Statistics for Bioinformatics	
MATH 7341	Probability 2	
MATH 7342	Mathematical Statistics	
MATH 7343	Applied Statistics	
MATH 7344	Regression, ANOVA, and Design	

**Graduate Certificate Programs**

The College of Science is pleased to offer several graduate certificate programs for working professionals as well as postbaccalaureate students who want to build their knowledge in growing fields. Graduate certificates are offered in biotechnology, bioinformatics, applied mathematics, nanomedicine, and sustainability sciences. These programs are ideal for people already in the field who want to enhance their career or people who are looking to make a change.

**Programs****Biology**

- Bioinformatics (p. 942)
- Omics (p. 944)

**Chemistry and Chemical Biology**

- Biodefense and Biosecurity (p. 953)
- Biopharmaceutical Analytical Sciences (p. 953)
- Biotechnology (p. 954)
- Biotechnology Enterprise (p. 954)
- Biotechnology Regulatory Science (p. 955)
- Experimental Biotechnology (p. 956)
- Manufacturing and Quality Operations in Biotechnology (p. 956)
- Molecular Biotechnology (p. 957)
- Pharmaceutical Technologies (p. 957)
- Process Science (p. 958)
- Vaccine Development (p. 958)

**Marine and Environmental Sciences**

- Sustainability Sciences (p. 972)

**Mathematics**

- Applied Mathematics (p. 988)

**Physics**

- Nanomedicine (p. 1007)

**College of Social Sciences and Humanities**

Website (<http://www.northeastern.edu/cssh/>)

Kellee Tsai, PhD, Dean

**Jun Ma, PhD**, Associate Dean, Graduate Studies

CSSH Graduate Office  
180 Renaissance Park  
617.373.5990  
gradcssh@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1031)

## Our Mission

The departments and programs of the College of Social Sciences and Humanities—with disciplines ranging from economics and history to English and international affairs, just to name a few—form an interdisciplinary collaborative of scholars with global perspectives. The CSSH mission is:

- To contribute to the experiential liberal arts education of all Northeastern University students
- To produce cutting-edge knowledge about and solutions to the political and social problems of our contemporary world
- To foster ethical reasoning and critical thought, with attention to the enduring significance of history, literature, and culture

This mission, along with a strong international focus, gives CSSH a central role in fulfilling Northeastern's ambition of educating global citizens.

## CSSH Graduate Programs

Graduate education at Northeastern integrates the highest level of scholarship across disciplinary boundaries with significant research and experiential learning opportunities. This multidimensional learning environment offers students an opportunity to develop critical-thinking and creative problem-solving skills while introducing them to new perspectives in their fields. CSSH supports 16 master's programs, 8 doctoral programs, and 12 graduate certificate programs. Some courses and degree programs are offered in an online or hybrid format that provides additional flexibility for learners. Graduate programs in CSSH provide fertile ground and resources for advanced study and research. CSSH faculty members' cutting-edge interdisciplinary work inspires the development of new programs, research fellowship opportunities, and mentoring relationships.

All CSSH master's programs offer an optional cooperative education experience to eligible students. Cooperative education is central to both the Northeastern experience and to the CSSH experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with up to six months of work experiences in businesses, nonprofits, and government agencies in Boston, across the United States, and around the world. Through the co-op experience and integrative cocurricular coursework, graduate students apply what they have learned across contexts, bringing knowledge and skills gained in community learning spaces back to our campus learning spaces.

Our doctoral, master's, and professional degree programs produce graduates who are well prepared for the diverse demands of careers in academia, industry, and the professions. Please visit the College of Social Sciences and Humanities (<https://cssh.northeastern.edu/>) website for additional information, including latest news and upcoming events.

## General Regulations

- Academic Appeals Procedures (p. 1031)
- Doctor of Philosophy (p. 1034)
- General Information (p. 1035)
- Master's Degrees (p. 1036)
- Regulations for All Students (p. 1037)

## Academic Appeals Procedures

Northeastern University affirms that it is essential to provide an appeals mechanism to students who believe that they have been erroneously, capriciously, or otherwise unfairly treated. Information about the university appeals process and procedures can be found in this catalog (p. 185).

If a student feels that they have been the victim of harassment or of discrimination prohibited by law or by university policy, and that this constitutes a substantive basis for the appeal, they should consult with the Office for University Equity and Compliance (<https://ouec.northeastern.edu/>) as soon as they become aware of alleged prohibited harassment or discrimination, and they are not required to wait until a term grade or determination is received before seeking advice or redress. If the Office for University Equity and Compliance is advised of such alleged prohibited conduct as part of an academic appeal, the appeal shall first be pursued and investigated through the Office for University Equity and Compliance. Following a resolution of the harassment/discrimination issues, any remaining academic issues will be addressed, at the request of the student, according to the academic appeals procedures.

In cases that do not involve sexual harassment or discrimination, students may speak informally to their instructors or academic advisors about any determination or grade about which they have questions. If students choose to pursue an appeal, the College of Social Sciences and Humanities

process is described in the appeals section that follows. The Graduate Academic Advisory Committee, which is comprised of an elected body of full-time CSSH faculty, serves as the Academic Appeals Committee for the CSSH.

### **Graduate Academic Advisory Committee**

The GAAC shall be responsible for ensuring that the graduate curriculum of the college promotes the college's and university's evolving intellectual and pedagogical aims. The GAAC acts on all matters relating to the academic life of graduate students in the college in accordance with guidelines approved by the college and the GAAC. The responsibilities of the GAAC are:

- a. Oversight over the quality and scope of the college's graduate curricula, including recommendations for changes to the general program of the college, approval of graduate degree and certificate programs, and review of proposed changes to those programs.
- b. Review of student appeals on decisions concerning grades, academic dismissals, academic probation, change in requirements, permission to resume studies, academic warning, and repeating of courses. The GAAC shall adhere to all policies and procedures adopted by the faculty of the college and the Faculty Senate.

In addition, the GAAC shall adhere to policies and procedures issued by the Office of the Provost. Actions on graduate matters taken by the GAAC shall constitute the recommendations by the faculty on these matters. The GAAC shall make recommendations on behalf of the faculty directly to the dean (or the dean's designee). If the dean supports them, the recommendations shall, as needed, then be sent to the University Graduate Curriculum Committee for consideration. The GAAC's and dean's actions shall be reported periodically to the units involved and to the college council for informational purposes.

The GAAC is charged with review of student appeals on decisions concerning grades, academic probation, change in requirements, permission to resume studies, academic warning, and repeating of courses. Members of the GAAC from the student's own unit are recused from the appeal process. Graduate students may request permission to present their appeals in person. If a student believes that all pertinent information has not been presented, the student may request that the GAAC reconsider its decision. If the GAAC reaffirms its action, and the student is still not satisfied, an appeal for review may be made through the university's Academic Appeals Resolution Committee. The appeals procedure is described in this catalog (p. 185).

### **Grade Appeals**

If a graduate student wishes to dispute a grade in a course taught by a member of the CSSH faculty, the first step is for the student to discuss their concerns with the faculty member who taught the course to see if it is possible to reach agreement on the issue(s). If the student is not able to resolve the issues with the faculty member who taught the course, the student should work with the department/program director to attempt a department-level resolution.

If these informal attempts to resolve the issue fail, the student can enter the formal procedure at the college level.

The student should meet with the associate dean for graduate studies who will attempt to resolve the issue by working with the instructor and the department/program. Contact the Graduate Office at [gradcssh@northeastern.edu](mailto:gradcssh@northeastern.edu) to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine whether or not there is just cause to convene the GAAC. In the event of an alleged violation of the Student Code of Conduct, the associate dean will first seek a determination of the violation from the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>).

The decision to convene the GAAC will be based upon the following:

- The student attempted to resolve the complaint with the professor and the department/program.
- The complaint is substantive in nature (adjudication could affect a student's course grade and/or academic record).
- The complaint has been brought forward in a timely manner.
  - The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student.
  - If a student wishes to dispute a grade in their final term, this must be done within 28 calendar days of the degree conferral date.

### **FORMAL COMPLAINT**

If the associate dean determines the appeal should be brought to the GAAC, the student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean.

- The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint.
  - It is the student's responsibility to make their case. Students may submit any evidence such as emails, quizzes, examinations, etc.
- Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the faculty member and to the department/program director and convene a meeting of the GAAC.
- If the student fails to provide a well-reasoned written summary of the case, then the matter will be considered closed at the college level.
- The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

## APPEALS MEETING

- The GAAC serves as the Academic Appeals Committee for the CSSH.
- The GAAC is convened in order to determine whether a fair and due process was used to determine the student's grade.
- The role of the committee is to conduct a review when a grade appeal is filed by a student regarding one of the following reasons:
  - Concern that the course grading policy was not applied consistently to all students within a class and/or section.
  - Concern that the instructor's method of assigning grades differed from the method outlined in the instructor's course syllabus.
  - Concern that the instructor failed to provide a clear policy on how grades would be assigned.

The student and the faculty member have the right to attend and present their case orally to the GAAC. The faculty member and the student aren't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the GAAC may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. The complainant and the faculty member both have the right to testify privately and separately before the committee. Lawyers are not permitted in these proceedings. Generally, the faculty member and complainant are each given a 15-minute period to present their case.

The student usually presents their complaint to the committee first. This is followed by a brief Q&A of the student by the GAAC. The GAAC may ask the complainant any questions they have based upon either the written statement submitted by the complainant or the complainant's oral presentation. The faculty member then presents their case, which is followed by a brief Q&A of the faculty member. After both the complainant and faculty member have addressed the GAAC, the GAAC then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the GAAC believes it cannot resolve any issues without additional information, the GAAC may request any information needed from either the complainant, faculty member, or department/program. This information must be provided to the GAAC within one week of the meeting. If the requested information is not provided in the required time frame, then the GAAC may weigh this failure in making its final determination regarding the original complaint.

## COMMITTEE PROCESS

- All decisions of the GAAC will be made based on a simple majority (51%) vote.
- Members of the GAAC from the student's own unit are recused from the appeal process.
- The associate dean is chair of the GAAC and only votes when there is a tie.
- The student bringing the complaint to the GAAC carries the burden of proof based on the weight of the evidence in demonstrating that the grade is incorrect or unjustified.
- If the GAAC decides that the grading process was unfair, the GAAC can request that the instructor changes the student's grade.
  - If an acceptable agreement involves a change of grade, the instructor is responsible for submitting a change of grade to the Office of the University Registrar in a timely manner following notification of the GAAC's decision.
- The student shall be notified within three business days of a decision being reached.

If the student is not satisfied with the GAAC's disposition of the matter, or if the grade appeal is not resolved within 35 calendar days after the written statement is submitted to the college, the student may further pursue the matter by requesting in writing that the university convene an Academic Appeals Resolution Committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

## Academic Dismissal Appeal

If a student wishes to dispute an academic dismissal, the first step is to consult the graduate director about appealing to the department/program. If and when all departmental appeals are exhausted, the student can enter the formal procedure at the college level.

The student will meet with the associate dean for graduate studies who will attempt to resolve the issue by working with the department/program. Contact the Graduate Office at [gradcssh@northeastern.edu](mailto:gradcssh@northeastern.edu) to schedule the meeting. If it is not possible for the associate dean to resolve the issue with the department/program, the associate dean will determine if the complaint is substantive and there is just cause to convene the GAAC.

## FORMAL COMPLAINT

The student must provide a formal written complaint to the associate dean within one week of the student's meeting with the associate dean. The statement must be submitted no later than 28 calendar days from the day when the academic determination is made available to the student. The written complaint should provide a detailed timeline as well as all available evidence supporting the student's complaint. Once the associate dean receives a formal written complaint, the associate dean will provide a copy of the complaint to the department/program director and convene a meeting of the GAAC. If the student fails to provide a thoughtful and well-reasoned written summary of the case, then the matter will be considered closed at the college level. In the event of an alleged violation of the Student Code of Conduct, the associate dean will first seek a determination of the violation from the Office of Student Conduct and Conflict Resolution (<https://osccr.sites.northeastern.edu/>).

The associate dean will make a good faith effort to identify a date and time for the meeting within 35 calendar days of the student's original submission of their statement.

**APPEALS MEETING**

- The GAAC serves as the Academic Appeals Committee for the CSSH.
- The GAAC is convened in order to determine whether a fair and due process was used.

The student has the right to attend and present their case orally to the committee. The student isn't required to attend; however, it is usually quite helpful to make an oral presentation and answer any questions that the GAAC may have. If the complainant indicates that they will present their case in person and then fails to attend the scheduled hearing, the case will be dismissed. Lawyers are not permitted in these proceedings.

The student usually presents their complaint to the GAAC first. This is followed by a brief Q&A of the student by the GAAC. The GAAC may ask the complainant questions based upon either the written case submitted by the complainant or the complainant's oral presentation. The GAAC then reviews the evidence, summarizes the case, and makes a recommendation to the associate dean concerning the resolution of the complaint.

If the GAAC believes it cannot resolve any issues without additional information, the GAAC may request any information needed from either the complainant or department/program. This information must be provided to the GAAC within one week of the meeting. If the needed information is not provided in the time frame required, then the GAAC may weigh this failure in making its final determination regarding the original complaint.

**COMMITTEE PROCESS**

- All decisions of the GAAC will be made based on a simple majority (51%) vote.
- Members of the GAAC from the student's own unit are recused from the appeal process.
- The associate dean is chair of the GAAC and only votes when there is a tie.
- The student bringing the complaint to the GAAC carries the burden of proof based on the weight of the evidence in demonstrating that the dismissal is incorrect or unjustified.
- If the GAAC decides that the academic dismissal should be revoked, the GAAC can request that the department reinstate the student immediately.

If the student is not satisfied with the GAAC's disposition of the matter, or if the dismissal appeal is not resolved within 35 calendar days after the written statement is submitted to the college, the student may further pursue the matter by requesting in writing that the university convene an Academic Appeals Resolution Committee to review the issue. This must be submitted within 10 calendar days of the notification from the college. This committee has been designated as the final authority on these matters. Students may obtain information on this process by contacting the Office of the Provost.

**Doctor of Philosophy**

The Doctor of Philosophy degree is awarded to candidates who give evidence of high scholastic attainment and research ability in their major field. Specific degree requirements are administered by a committee in charge of the degree program. It is the responsibility of the chair of this committee to certify to the college the completion of each requirement for each candidate. Note that advanced standing is determined at the time of admission by the graduate program director.

**Continuity of Registration**

Students are expected to maintain satisfactory progress toward their intended degree. All students must register as approved by their advisors or the departmental graduate program directors. After establishing degree candidacy, registration must be continuous until graduation requirements are complete unless a leave of absence is allowed by and recommended by the departmental graduate committee and approved by the college. For each of the first two semesters that a doctoral candidate has established candidacy, the student must register for Doctoral Dissertation. For each semester beyond the two Dissertation registrations, the student must register for Doctoral Dissertation Continuation until the dissertation is approved by the college and submitted to ProQuest. During the terms when a student is registered for Doctoral Dissertation or Dissertation Continuation, coursework is not permitted as the course requirements for the degree have already been met. If the academic program requires enrollment in seminars or courses in addition to Dissertation or Dissertation Continuation, the graduate program director will make a recommendation to the college. Approval of the college must happen prior to registration. Students must be registered for Dissertation or Dissertation Continuation during the semester in which they take the final oral examination (including the full summer semester if that is when defense occurs). Any student who does not attend Northeastern University for a period of one year may be required to apply for readmission.

**Awards**

Funding eligibility is contingent upon making satisfactory progress. See Regulations for All Students (p. 1037) for more information.

**Course Requirements**

Course requirements in each doctoral program are specified by the committee in charge of the doctoral program and departmental regulations. These are detailed in the academic catalog for the student's term of entry.

**GPA Requirements**

For all College of Social Sciences and Humanities doctoral degree programs, the minimum cumulative grade-point average is 3.500. To qualify for the degree, the minimum cumulative GPA must be obtained. This average will be calculated each semester according to the grading system noted in the academic catalog and will exclude any transfer credits or repeated courses. Individual programs may have additional GPA requirements. These can be found in the academic catalog or program policies and procedure documents. A student who does not make satisfactory progress toward degree

requirements, as specified by the individual department, may be placed on academic probation or dismissed from the program. A student cannot begin working on exam requirements with a GPA that is below the program minimum.

## **Annual Student Progress Review**

All PhD degree students are required to meet with their faculty advisor for an annual student progress review. The reviews will be submitted to the departmental graduate committee, which will determine whether satisfactory progress is being made and students are eligible to proceed to complete their graduate work. The CSSH Graduate Office will receive a copy of each student's review.

## **Residence Requirement**

All PhD students must spend the equivalent of at least one academic year in residence at the university as a full-time graduate student. The departmental graduate committee specifies the method by which the residence requirement is satisfied. Residency is required of all students receiving a stipended graduate assistantship.

## **Qualifying Examinations**

In programs where comprehensive or qualifying exams are required, students must complete these requirements within the time limit set by the program.

## **Dissertation Proposal**

All CSSH doctoral programs require an approved prospectus or successful proposal defense for candidacy.

## **Doctoral Degree Candidacy**

PhD degree candidacy is established when students have completed all departmental requirements for candidacy. These requirements vary by department and include completing the minimum number of graduate semester hours required of doctoral students by the department (this may include an earned master's degree accepted by the department) and passing a qualifying examination and/or a comprehensive examination. All CSSH doctoral programs require an approved prospectus or successful proposal defense for candidacy. Once students reach doctoral degree candidacy they will be certified, in writing, by the college. Registration in coursework is not permitted once a student reaches candidacy.

## **Doctoral Dissertation**

Each doctoral student must complete a dissertation that embodies the results of extended research and makes an original contribution to the field. This work should give evidence of the candidate's ability to carry out independent investigation and interpret in a logical manner the results of the research. The method of approval of the dissertation is established by the departmental graduate committee. No dissertation committee shall have fewer than three faculty members, two of whom shall be from Northeastern. The chair of the dissertation committee will be a full-time tenured or tenure-track member of the faculty of Northeastern and will hold an appropriate doctorate. A research faculty member may chair a dissertation committee if the faculty member holds an appropriate doctorate and has received the approval to do so from the tenured and tenure-track faculty members of the unit(s) in which their appointment resides.

## **Final Oral Examination**

The final oral examination will be on the subject matter of the doctoral dissertation and on important developments in the field of the dissertation. Other fields may be included if recommended by the examining committee. This examination will be taken after completion of all other degree requirements and must be held at least four weeks prior to the commencement at which the degree is to be awarded. All internal and external committee members are expected to participate in the defense. The college must be notified of all scheduled defenses and expects that the defense will be publicly advertised for at least two weeks prior to the scheduled date. Some programs may require up to 30 days' notice.

- Upon successful defense of the dissertation, the student must have a dissertation approval record signed by the members of the dissertation committee and the department chair. Contact the CSSH Graduate Office at [gradcssh@northeastern.edu](mailto:gradcssh@northeastern.edu) for the approval form template.
- The student must have the dissertation approval record approved by a representative from the CSSH Graduate Office.
- The student must submit an electronic copy of the dissertation to ProQuest, following the directions outlined at the University Library website.

## **General Information**

For information about other academic policies and procedures; student responsibilities; student academic and cocurricular life; faculty rights and responsibilities; or general personnel policies, benefits, and services, please refer to university policies (p. 154) and related procedural guides, as appropriate.

## **Student Classification**

Regular student—Students who are admitted to a degree or certificate program.

Special student—Nonmatriculated students who are enrolled in College of Social Sciences and Humanities graduate courses on a part-time basis (fewer than 8 semester hours per semester). Special students may earn up to 12 semester hours over time. Special students who do not register for four consecutive semesters (excluding summer semester) may be subject to review and possible withdrawal by the college. Graduate certificates and degrees cannot be conferred upon students in special student status. In keeping with university regulations, international students cannot be admitted as special students.

Doctoral degree candidate—Doctoral students who have completed departmental, college, and university requirements except for dissertation.

## Student Status

For academic purposes, a graduate student is considered a full-time student if enrolled in a minimum of 8 semester hours of credit for the semester, with the following exceptions:

- Students who hold Stipended Graduate Assistantships will be considered full-time if enrolled for a minimum of 6 semester hours of credit. However, some departments may require more credits for maintaining departmental progression standards.
- Students enrolled in Doctoral Research or full-time co-op are considered full-time.
- All graduate students who are formally registered in a continuation status—Dissertation, Dissertation Continuation, Doctoral Research, or Qualifying/Comprehensive Exam Preparation courses—may be considered full-time. It is ordinarily assumed that such students will be in residence.
- Students in their last semester of coursework may be enrolled in fewer than 8 semester hours to complete degree requirements. *Note:* To be eligible for some types of financial aid, the minimum full-time load may be defined differently. For information, contact the Graduate Student Financial Services Office.

Continued registration in the CSSH is contingent upon receiving all official transcripts and test scores within 30 days of matriculation. Please note that you may be asked to provide us with these if you did not include official copies in your application.

## Grading System

The student's performance in graduate courses will be graded according to the following numerical equivalents in the Academic Catalog (p. 176).

## Grading Policies

Grading policies applying to all students may be found in the Academic Catalog (p. 154).

In the CSSH, not more than two courses or 6 semester hours of credit, whichever is greater, may be repeated to satisfy the requirements for the degree. Only such repeats will be counted in calculating the cumulative grade-point average. No grade changes are permitted after the end of the final examination period one calendar year from the semester in which the student registered for the course. This includes the clearance of incomplete grades (p. 179). In calculating the overall cumulative average, all graduate-level coursework completed at the time of clearance for graduation will be counted.

Students cannot elect a pass/fail grading scheme for CSSH courses unless the course grading scheme is designated pass/fail.

## Class Credits

All credits are entered as semester hours. Graduate office policy states that in calculating the overall GPA, all graduate-level coursework completed at the time of clearance for graduation will be counted unless otherwise designated at the time of registration or unless counted toward a previous degree.

## Master's Degrees

### Academic Requirements

A candidate for the master's degree must complete a minimum of 30 semester hours of graduate-level coursework and additional requirements as determined by the department in which the student is registered.

To qualify for the degree, a minimum cumulative average of 3.000, equivalent to a grade of B, must be obtained. This average will be calculated each semester according to the university grading system (p. 176) and will exclude any transfer credits and nonrepeatable courses that have been retaken. A student who does not make satisfactory progress toward degree requirements, as specified by the individual department, may be dismissed from the program.

### Continuity of Registration

Students are expected to maintain satisfactory progress toward their intended degrees. All students must be registered in the last semester of their program. Any student who does not attend Northeastern University for a period of one year will be required to apply for readmission.

### Comprehensive Examination

Some programs require a final written or oral comprehensive examination. This examination will be given by the department concerned at least two weeks before the commencement at which the degree is expected. Students should check with individual departments for specific guidelines.

### Thesis

Some programs require or offer Master's Thesis. Theses should demonstrate the individual's capacity to execute independent work based on original material. Registration for XXXX 7990 Thesis is required. In cases in which a grade is required, theses must receive a grade of B (3.000) or better to be accepted. Students who have not completed their thesis after having registered for the specified number of thesis credits must register for XXXX 7996 Master's Thesis Continuation in the subsequent semester. Master's Thesis Continuation will carry no credit but will be recorded on the student transcript with the appropriate grade (S or U). Master's Thesis Continuation is not repeatable.

- Upon successful defense of the thesis, the student must have a thesis approval record signed by the members of the thesis committee. Visit Thesis and Dissertation Formatting Guidelines (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>) for the approval form template and additional guidance.
- The student must have the thesis approval record approved by a representative from the CSSH Graduate Office.
- The student must submit an electronic copy of the thesis to ProQuest, following the directions outlined on the University Library website.

## Regulations for All Students

### Registration

Students must register via the Student Hub (<https://me.northeastern.edu>). Procedures to do so are available on the Office of the University Registrar's website. Consult the Academic Calendar (<https://registrar.northeastern.edu/group/calendar/>) for important registration dates.

Students are encouraged to obtain advisor approval of course selections each semester. This approval is required for all assistantship recipients and by some departments for all students. Students should check with individual departments for specific guidelines.

Students are expected to only complete the courses and semester hours required for the degree or certificate. Any courses taken outside of those requirements must be approved by the director of the graduate program.

### Transfer Credit

For general regulations concerning transfer credit in Northeastern University's graduate degree programs, please visit Regulations and Requirements for All Graduate Degree Programs (p. 191).

Degree students may petition to transfer credit through their departments to the College of Social Sciences and Humanities Graduate Office by completing the Transfer Credit form on the Office of the University Registrar's website. An official transcript must be attached to the petition.

### Awards

Only those students who are registered in degree programs are eligible for awards. Award recipients will receive an official award letter from the CSSH Graduate Office. Please pay attention to this letter as it is an official contract that should be read carefully. In order to maintain awards, students must be making satisfactory progress toward their degrees. Please refer to the Satisfactory Academic Progress section below for more information.

Students receiving a Stipended Graduate Assistantship must be in full-time status and be registered for a minimum of 6 semester hours. The standard duration of the SGA funding window is five years beginning from the time of admission and is not changed based on the source of funding or if the stipend is declined in any given semester(s). The health plan fee (NUSHP) is covered by the SGA award whereas the University Health and Counseling Services fee is not. Students on an SGA must be available to come to campus during normal business hours and are expected to spend 20 hours per week supporting their assignment. Unsatisfactory progress in either the graduate program or performance in assistantship-related duties or any deviation from the above may result in the early termination of the assistantship. Near the end of each funded term, student performance will be evaluated by their assignment supervisor and that evaluation will be filed with the CSSH Graduate Office.

CSSH Dean's Scholarship and Excellence Fellowship recipients must be in full-time status and be registered for a minimum of 8 semester hours.

### Withdrawal from Courses

To withdraw from a course, a student must drop the course via the Student Hub within the deadlines as established by the Office of the University Registrar. Consult the Academic Calendar (<https://registrar.northeastern.edu/group/calendar/>) for more information.

### Satisfactory Academic Progress

Satisfactory academic progress means satisfying requirements in the graduate program's general regulations and in the regulations specified by each department.

The college sets minimum standards for all students to fulfill, including:

- Maintaining the graduation requirement of a cumulative grade-point average of 3.000 (3.500 for doctoral programs) in their coursework
- Timely completion of coursework
- Timely completion of comprehensive/qualifying examinations

Departments and programs may have additional requirements that exceed those of the college. These requirements can be found in the Academic Catalog and department guides. Failure to maintain satisfactory academic progress may result in academic probation or dismissal from the program.

Receipt of financial support administered by the college is contingent on satisfactory academic progress toward the degree and on meeting department-specific guidelines. The college requires that all students receiving awards will generally have two semesters to reach a 3.000 GPA. Students whose cumulative GPA is below 3.000 (3.500 for doctoral programs) will be reviewed by their departments and by the CSSH Graduate Office and may have their funding terminated on recommendation of their department or by decision of the college in consultation with their department. In addition, continued funding for SGAs is contingent on satisfactorily carrying out duties as assigned.

Students enrolled in a program offering a cooperative education or internship option must be approved to participate. A minimum GPA of 3.000 is required at the time the co-op job or internship begins. Some departments may require a higher minimum GPA for co-op. Please refer to the Academic Catalog for program-specific information.

## Leave of Absence

Full-time students who will not be involved in any academic endeavor for a period of time are required to petition via the Request for Leave of Absence form on the Student Hub (<https://me.northeastern.edu>). The CSSH Graduate Office will not accept retroactive leave requests. Please note that if a student is requesting a leave for medical reasons (p. 177), a Medical Leave of Absence form must be completed. Students should contact University Health and Counseling Services.

Leaves of absence generally are not approved for more than one calendar year at a time. Further, a leave of absence is generally not appropriate for an international student on a student visa, unless the student is leaving the United States. The student must consult with an international student advisor at the Office of Global Services.

Leaves of absence are not appropriate for master's or doctoral students who are working on a thesis or dissertation but are away from the Northeastern campus.

Except in the case of medical leaves, being on an approved leave of absence does not extend the amount of time allowed for degree completion or the makeup of incomplete grades.

## Time Limitations

Graduate course credits earned in the program of graduate study or accepted by transfer are valid for a maximum of seven years.

If students wish to apply for an extension of the university's seven-year time limit, they must submit a petition to their department of study. The petition must include a detailed plan for the completion of all remaining degree requirements. In the case of master's time-limit extension requests for coursework, the department must certify that the content of each of the courses has not changed since the time the student completed the course. If deemed appropriate, the department will recommend the approval of an extension to the college. The associate dean has final approval of time-limit extensions.

## Application for the Diploma

Application for the diploma is made by applying to graduate. More information is available on the Commencement website (<https://commencement.northeastern.edu/>). Even though all other degree requirements may have been met, the application to graduate must be completed in order to assure that the degree will be conferred on the appropriate graduation date. It is the responsibility of the student to make sure that degree requirements have been met. Once degree requirements have been met, the student will be cleared for commencement. Please note that there are no honors distinctions awarded at the graduate level.

## Changes in Requirements

The continuing development of the college may result in regular revision of curricula. When curriculum changes are made, students are allowed to complete the degree requirements of the program when they matriculated. If a student wishes to complete the degree requirements of the new curriculum, the student may request this in writing to the CSSH Graduate Office via [gradcssh@northeastern.edu](mailto:gradcssh@northeastern.edu).

## School of Criminology and Criminal Justice

Website (<https://cssh.northeastern.edu/sccj/>)

**Amy Farrell, PhD**  
Professor and Director

**Kevin Drakulich, PhD**  
Professor and Associate Director

617.373.3327  
617.373.8723 (fax)  
[sccj@northeastern.edu](mailto:sccj@northeastern.edu)

CSSH Graduate Programs General Regulations (p. 1031)

The School of Criminology and Criminal Justice prepares students for meaningful careers in criminology, justice policy, the law, criminal justice, and related fields, including professional research careers. We do this by applying multidisciplinary social science tools that predict and explain crime, as well as deepening the understanding of policies that improve our systems of justice. Our approach is experiential, and our methods for teaching are rooted in knowledge creation as a top-tier research program. Our goal is to create ethical problem solvers who are prepared to tackle important crime and justice issues facing society. Our educational goals for students include a commitment to identify and address the role of systemic racism and intersecting dimensions of oppression in the development and application of justice system policies and practices, crime and justice theory, and research.

The school offers a Master of Science degree in criminology and criminal justice and a PhD degree in criminology and justice policy. In addition, the school offers a JD/MS in criminology and criminal justice program and a JD/PhD in criminology and justice policy in conjunction with the School of Law.

## **Programs**

### **Doctor of Philosophy (PhD)**

- Criminology and Justice Policy (p. 1039)

### **Master of Science (MS)**

- Criminology and Criminal Justice (p. 1042)

### **Dual Degrees**

- Law, JD/Criminology and Justice Policy, PhD (p. 828)
- Law, JD/Criminology and Criminal Justice, MS (p. 828)

### **Graduate Certificate**

- Crime Analysis and Mapping (p. 1044)

### **Criminology and Justice Policy, PhD**

The doctoral program in criminology and justice policy at the School of Criminology and Criminal Justice at Northeastern University seeks to prepare students for professional and research careers in criminal justice, criminology, and related fields by applying multidisciplinary and comparative social science to understand, predict, and explain crime and contribute to the development of public policy within urban communities. Using an active-learning approach, the school seeks to develop its students intellectually and ethically, while providing them with a keen appreciation for the complexities of crime and public and private efforts to make communities safer and to ensure justice.

The program is full time and is small and student centered. Students may enter the program with either a bachelor's degree or a master's degree. It is expected that students will be able to complete the program in four to five years, and students entering with a master's degree will be able to complete the program in three to five years.

Year one in the doctoral program offers students an opportunity to obtain a broad foundational knowledge in the discipline: one semester on theories of criminal justice process, two semesters of criminological theory, two semesters of statistics, and one semester of advanced research methods. To ensure that all students have mastered the foundational material emphasized across the required courses for the PhD program and can successfully integrate theory, research, and policy, all PhD students take a "foundations" qualifying examination at the end of their first year in the doctoral program.

After demonstrating mastery of the foundational knowledge in year one, students devote themselves to a more specific area of research in years two and three. Students demonstrate this commitment through the second and third qualifying examinations: an area exam and a publishable paper.

Following successful completion of the three qualifying examinations, and required and elective course work, the students proceed to a formal dissertation proposal defense.

### **Doctoral Degree Candidacy**

A student achieves candidacy when they have successfully completed all course work (54 semester hours for students entering with a bachelor's degree or 42 semester hours for students entering with advanced standing), passed all three qualifying examinations, and deposited the final version of their dissertation proposal (approved by their full committee) with the school's graduate program office. Candidacy is certified, in writing, by the college.

### **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### **Bachelor's Degree Entrance**

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review

Three qualifying examinations—foundations exam, area exam, and publishable paper

Dissertation committee

Dissertation proposal

PhD candidacy

Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Pro-Seminar</b>		
CRIM 7001	PhD Pro-Seminar in Criminology and Justice Policy 1	0
CRIM 7002	PhD Pro-Seminar in Criminology and Justice Policy 2	0
<b>Criminal Justice Process</b>		
CRIM 7203	Theories of Criminal Justice Process	4
<b>Criminological Theory</b>		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
<b>Analysis &amp; Methods</b>		
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
<b>Practicum</b>		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

## Electives

Code	Title	Hours
Complete 28 semester hours in the following ranges. Courses in additional disciplines with PhD program director approval.		
CRIM 6000 to CRIM 7999		28
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		

## Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
CRIM 8960	Exam Preparation—Doctoral	
CRIM 8986	Research	
<b>Dissertation</b>		
CRIM 9990	Dissertation Term 1	
CRIM 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		
CRIM 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

54 total semester hours required

Minimum 3.500 GPA required

## Advanced Entry Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Advanced Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Annual review

Three qualifying examinations—foundations exam, area exam, and publishable paper

Dissertation committee

Dissertation proposal

Candidacy achieved

Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Pro-Seminar</b>		
CRIM 7001	PhD Pro-Seminar in Criminology and Justice Policy 1	0
CRIM 7002	PhD Pro-Seminar in Criminology and Justice Policy 2	0
<b>Criminal Justice Process</b>		
CRIM 7203	Theories of Criminal Justice Process	4
<b>Criminological Theory</b>		
CRIM 7710	Criminology and Public Policy 1	4
CRIM 7711	Criminology and Public Policy 2	4
<b>Analysis &amp; Methods</b>		
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
<b>Practicum</b>		
CRIM 7706	Practicum in Writing and Publishing	2
CRIM 7700	Practicum in Teaching	0

### Electives

Code	Title	Hours
Complete 16 semester hours in the following range.		
CRIM 6000 to CRIM 7999		16
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		

### Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
CRIM 8960	Exam Preparation—Doctoral	
CRIM 8986	Research (Exam Preparation)	
<b>Dissertation</b>		
CRIM 9990	Dissertation Term 1	
CRIM 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		

Following completion of CRIM 9990 and CRIM 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:

CRIM 9996

Dissertation Continuation

## Program Credit/GPA Requirements

42 total semester hours required

Minimum 3.500 GPA required

### Criminology and Criminal Justice, MS

The master's program in criminology and criminal justice at Northeastern University concentrates both on the problem of crime as a form of deviant behavior and on the criminal justice and private security systems that deal with it. The program emphasizes a systems approach to criminal justice, stressing policy development and analysis, as well as the impact these policies have on the individuals and organizations charged with delivering justice in a fair and equitable manner. In concept and scope, the MS degree encompasses such related disciplines as law, sociology, political science, psychology, criminology, and public administration.

The master's program is comprised of required courses encompassing both substantive and technical skills. Additionally, students choose elective courses from offerings within the graduate program in criminal justice or in other graduate programs in the College of Social Sciences and Humanities. The course offerings afford students the flexibility to customize their own programs, which may include an internship, directed study, or master's thesis.

For students interested in criminal justice in an increasingly digital world, the Master of Science in Criminology and Criminal Justice with a Concentration in Cybersecurity offers a strong criminal justice foundation coupled with the conceptual and practical skills that enables them to contribute to ensuring the reliability and security of cyberspace. Successful students will learn the principles, practices, and responsibilities of criminal justice professionals alongside the fundamental knowledge of computer science skills necessary for practical applications in the field. The concentration in cybersecurity provides criminal justice students an opportunity to learn how social behavior, policy, and legal rules can affect cybersecurity and the tools of information technology.

Faculty members in the graduate program represent several different academic disciplines, and teaching activities vary in nature depending on the instructors' specific objectives. The faculty's specialized interests help make possible a broad range of program offerings, including courses on the criminal justice process, victimology, security management, criminal law, juvenile justice, law and psychology, and terrorism.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Students extend the two-semester program to 18 months through a co-op work experience and Experiential Integration (INSH 6864), the associated experiential integration course. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Briefly stated, the graduate program endeavors to:

- Assist in developing criminal justice and private security leaders capable of assuming responsibility for policy planning and administration
- Offer students an opportunity to acquire the necessary skills and knowledge to conduct applied research while assisting them in developing the ability to apply this research in a variety of criminal justice settings
- Provide an opportunity for a solid educational foundation for those who wish to pursue more advanced graduate study beyond the Master of Science degree

Graduate study in criminology and criminal justice may be pursued on either a full- or part-time basis. All candidates for the Master of Science in Criminology and Criminal Justice degree must successfully complete a minimum of 32 semester hours of credit in course work.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Required Core</b>		
CRIM 6200	Criminology	4
CRIM 6202	The Criminal Justice Process	4
<b>Research and Statistics</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

## Electives

Code	Title	Hours
Complete 16 semester hours in the following range.		
CRIM 5000 to CRIM 7999		16
INSH 5000 to INSH 7999		
POLS 5000 to POLS 7999		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999		

## Optional Concentration in Cybersecurity

Students adding a concentration in cybersecurity must use 12 semester hours of their elective credits to complete the following courses:

Code	Title	Hours
<b>Required</b>		
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	4
Choose two courses from the following:		
CRIM 6262	Evidence-Based Crime Policy	
CY 5010	Cybersecurity Principles and Practices	
CY 5200	Security Risk Management and Assessment <sup>1</sup>	
CY 5210	Information System Forensics <sup>1</sup>	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	

<sup>1</sup> Instructor approval

## Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms.		
CRIM 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1-2

## Program Credit/GPA Requirements

32 total semester hours required (33-34 with optional co-op)

Minimum 3.000 GPA required

### Law, JD / Criminology and Justice Policy, PhD

The JD/PhD program will expand the knowledge base and career options of students. The disciplines of criminology and justice policy and law share common interests in identifying opportunities to create conditions for justice, equality, and societal well-being. The dual degree will provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the sociopolitical, legal, and economic context in which they are found. Solving problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the PhD degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the law school. Students will take criminology courses during semesters spent in SCCJ. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about PhD requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

## Law, JD / Criminology and Criminal Justice, MS

The JD/MS program will expand the knowledge base and career options of students. The disciplines of criminal justice and law share common interests in identifying opportunities to create the conditions for justice, social equality, and societal well-being. The dual degree is designed to provide students with a comprehensive interdisciplinary understanding of what influences criminal justice problems and the social, political, legal, economic context in which they are found. Solving these problems requires interdisciplinary knowledge and an analytical and practical skill set that includes interprofessional problem solving.

Up to 16 credits of coursework in the dual-degree program can be counted toward both the JD degree and the MS degree. Of these 16 credits, no more than 12 credits of non-law courses can count toward the JD degree.

Students will take law courses during semesters spent in the School of Law. Students will take criminology courses during semesters spent in the School of Criminology and Criminal Justice. Please consult the School of Law (<https://www.northeastern.edu/law/>) for more information about JD requirements. Additionally, please consult SCCJ (<https://cssh.northeastern.edu/sccj/>) for more information about MS requirements.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

## Crime Analysis and Mapping, Graduate Certificate

The Graduate Certificate in Crime Analysis and Mapping is a response to calls to integrate data-driven policing into the organizational culture of public safety agencies. Crime analysis is a deep examination of the criminogenic factors that help us understand why crime occurs. Crime mapping is a key component of crime analysis that is used by law enforcement, city planners, urban planners, corporate risk and enterprise professionals, and public health specialists to map, visualize, and analyze crime incident patterns. Together, sound crime analysis and crime mapping diagnose problems to facilitate tailored responses to crime and to reduce the frequency and severity of crime problems. Sound crime analysis allows for granular assessments of crime problems, which can facilitate the development of public safety programs in a manner that minimizes the risk for unintended harmful effects in the community. Crime analysis and mapping are key components of evidence-based programs that simultaneously promote crime prevention and social justice. This certificate is designed to contribute to students' understanding of how to critically assess crime patterns and connect crime data to other geographic data in order to inform prevention activities and efforts to improve public safety and security and to present the ways in which data management, geospatial and temporal crime data, and map construction can be used to develop crime policy.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Required Courses

Code	Title	Hours
CRIM 6801	Fundamentals of Crime Analysis and Mapping	4
CRIM 6802	Data Management for Social Scientists	4

### Electives

Code	Title	Hours
Complete 4 semester hours from the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 5303	Machine Learning in the Social Sciences	
INSH 5304	Social Network Analysis	
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	

INSH 6304	Modeling and Analyzing Social Networks
INSH 6406	Analyzing Complex Digitized Data
PPUA 5262	Big Data for Cities
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6509	Techniques of Program Evaluation

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Economics

Website (<https://cssh.northeastern.edu/economics/>)

**Michael Stone, PhD**

Teaching Professor and Interim Chair

617.373.2882

gradecon@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1031)

The Department of Economics offers both a Master of Science and a Doctor of Philosophy in Applied Economics. The most distinctive feature of these programs is their emphasis on applied economics, coupled with attention to providing a solid grounding in microeconomic and macroeconomic theory, and econometrics. Students come from all over the world, and the curriculum is designed with this in mind, striving for balance in coverage of economies that are rich and poor, large and small, mixed and market. This gives a unique flavor to the course of study, making it well suited to the analysis of the emerging global economy of the 21st century.

The Master of Science program is in applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students.

The program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry while providing a rigorous basis for those who want to continue their studies to the doctoral level.

Our signature co-op program offers qualified MS students the opportunity to apply for paid work positions as practicing economists for up to six months as part of their academic program. This paid work experience enhances our MS degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, solve problems, and make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates find jobs after completing our program.

Master of Science students may choose to pursue a concentration in data science. The concentration strategically combines econometrics and machine-learning techniques to analyze and predict outcomes with Big Data. Students in Seattle are required to select this concentration.

Our master's program-specific learning courses also feature "tracks." Along with the core MS classes, these informal tracks help our students prepare for different career paths. The Department of Economics currently offers three tracks (<https://cssh.northeastern.edu/economics/program/ms-graduate-program/available-tracks/>):

- Policy
- Quantitative analysis
- Academic

The PhD program is small and focused, and we welcome applications from those with a bachelor's or master's degree who have had prior training in macroeconomic and microeconomic theory and possess strong quantitative skills. Students take core course sequences in microeconomics, macroeconomics, and econometrics, followed by field course sequences in their second year. Students take field coursework in:

- Industrial organization, competition policy, and regulation
- Labor economics

In addition to industrial organization and labor, students take field courses, when available, in other research areas, including development economics.

## Programs

### Doctor of Philosophy (PhD)

- Economics (p. 1046)

**Master of Science (MS)**

- Economics (p. 1049)

**Economics, PhD**

The PhD program in economics offers specializations in *industrial organization, competition policy, and regulatory economics* and *labor economics*.

**Timeline**

The PhD program for each student has two phases: the coursework phase followed by the dissertation phase. The coursework phase consists of required coursework and field courses, as well as taking and passing the three qualifying examinations.

A student moves into the dissertation phase upon successful completion of required coursework and upon passing the qualifying examinations. In the dissertation phase the student must prepare a dissertation proposal and present and defend the dissertation proposal before the student's proposal review committee. A student who successfully defends the dissertation proposal achieves candidacy. At the end of the dissertation phase, the student must defend their completed dissertation.

**Coursework**

Students entering the doctoral program will take seven core classes (28 semester hours), two classes in each of two doctoral fields (16 semester hours), and one elective (4 semester hours), for a total program requirement of 48 semester hours.

Core courses are focused on developing an advanced theoretical and quantitative foundation (macroeconomic theory, microeconomic theory, and applied econometrics). The remainder of the coursework is focused on the sophisticated application of analytical tools in the chosen field of concentration.

PhD students are expected to take three classes per semester as necessary to meet the degree's coursework requirements in the minimum number of semesters.

**Field Coursework and Grade Requirement**

Students must take four field courses, and they are strongly encouraged to take as many field courses as possible. Students should plan to take the two labor and two industrial organization courses, even if they arrange to do a field in development or health economics. Students interested in customizing their fieldwork should consult the PhD Program Guidelines on the website.

**To maintain satisfactory standing in the PhD program, students must earn a grade of B or higher in at least four field courses.** Students who do not earn a B in at least four field courses will be offered one opportunity to meet the grade standard. Consult PhD Program Guidelines on the website for further details.

**Examinations****THREE QUALIFYING EXAMINATIONS—MACROECONOMICS, MICROECONOMICS, AND ECONOMETRICS**

Three qualifying examinations are required upon completion of Macroeconomics 2, Microeconomics 2, and Econometrics 2. Students must receive a minimum grade of B– in the associated theory class to sit for its exam. Students are given a maximum of two attempts to pass each exam to continue in the program. Failure to sit for an exam at the appropriate time without prior consent of the graduate program director will result in an automatic fail on that exam.

**Proposal Review**

Students must complete the proposal review within two years of finishing their coursework; however, the department expects that a doctoral candidate's **dissertation committee** will be formed and the dissertation proposal presented within one year of reaching degree candidacy, which is normally by the end of the student's third year.

A **dissertation proposal** states the question or hypothesis, reviews the relevant literature, and explains how the proposed work will contribute to that literature and general understanding. The proposal sets forth data sources, models, and econometric issues in sufficient detail so that any faculty member not in the field will be able to assess its merits. Normally, the proposal should not exceed 30 double-spaced pages. The proposal is first approved by the dissertation committee and then presented at an open seminar.

Consult PhD Program Guidelines on the website for further details.

**Doctoral Degree Candidacy**

Upon successful completion of the proposal review, the student becomes a degree candidate. Candidacy may make the student eligible for a higher stipend and is an essential step in making satisfactory progress. Degree candidacy must be achieved within two years of completion of required coursework.

**DISSERTATION**

Students must complete their dissertation defense within five years of finishing their coursework, and postponing the proposal review does not alter the total time that students may use to complete their PhD. Under extenuating circumstances, a student may request an extension of this time frame from the Graduate Office.

One month in advance of the prospective date of the defense, the completed dissertation that is to be defended must be circulated to the committee members. At that time, all members of the committee must sign off on their agreement that the dissertation is ready for defense. Each student will have a dissertation committee chaired by a faculty member with an appointment in the economics department and at least two other members. Committees may have two cochairs. Committees should not have more than four members (except at interim stages if faculty are leaving the committee). Committees may include members outside the economics department, but at least two committee members must have an appointment in the economics department. The composition of the committee should be set before the proposal review and again, if changes occur, before the dissertation defense. Committee compositions must be approved by the graduate program director and department chair.

The dissertation defense normally takes place during the student's fifth year. Those who have not defended by the end of their fifth year must submit a status report and timetable for approval by their dissertation advisor and the PhD program director. Consult PhD Program Guidelines on the website for further details.

### **WRITING THE DOCTORAL DISSERTATION**

Writing the dissertation entails working with the principal advisor and other committee members until it is determined that a dissertation is complete and the candidate is ready to present and defend the work at an open seminar. Candidates must arrange a date and time for the defense at least three weeks in advance. Students must familiarize themselves with the Theses and Dissertations Formatting Guidelines (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>). The guide provides links to formatting tips, sample introductory pages, sample approval record, and deadlines. In addition, a checklist is provided to ensure students have fulfilled the required steps in the commencement clearance process.

### **Milestones**

Maintaining satisfactory academic progress during doctoral candidacy requires the following:

#### **PHD ANNUAL STUDENT PROGRESS REVIEW**

Each PhD student will have an annual review of their progress toward the degree. Receipt of financial support administered by the graduate school is contingent upon satisfactory academic progress toward the degree and satisfactory performance in assigned duties. See the CSSH General Regulations (p. 1031) for further details.

#### **FIELD WORKSHOP PARTICIPATION**

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend a field seminar in industrial organization or labor. These seminars meet roughly every week, and their purpose is to assist students in choosing and evaluating dissertation topics as well as advancing and completing their dissertation. All doctoral candidates will be expected to present their research at various stages of writing their dissertation.

#### **SEMINAR SERIES PARTICIPATION**

All PhD students registered for Doctoral Dissertation or Continuation who are in residence are expected to regularly attend academic seminars by speakers invited to campus through the Department of Economics Seminar Series. Participation in these seminars is an important component of doctoral training and is intended to expose students to current research in their field while helping to develop and hone their own presentation skills.

#### **PRACTICAL EXPERIENCE IN APPLIED ECONOMICS PROGRAM**

Participation in at least one semester of the Practical Experience in Applied Economics program is required of all students who have reached doctoral candidacy. The program is offered in the spring semester every other year. In this program, a variety of prominent practitioners working in consulting and government agencies in the fields of industrial organization and labor will describe their practical experience applying economics to a variety of consulting and policy problems, including antitrust, regulation, labor market policy, education, and health policy. This is a participatory class that will require advanced reading and preparation of questions for the practitioners in addition to other assignments.

## **Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### **Milestones**

Three qualifying examinations—microeconomics, macroeconomics, and econometrics

Annual reviews

Dissertation committee

Dissertation proposal

## Dissertation defense

Field workshops (and present following completion of coursework)

Economics Seminar Series and Job Talks

Practical Experience in Economics series

**Core Requirements**

Code	Title	Hours
<b>Quantitative</b>		
ECON 6105	Advanced Mathematics and Statistics for Economists	4
ECON 6140	Advanced Applied Econometrics	4
ECON 7740	Applied Econometrics 2	4
<b>Theory</b>		
ECON 6110	Advanced Microeconomic Theory	4
ECON 6120	Advanced Macroeconomic Theory	4
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
<b>Field</b>		
To maintain satisfactory standing in the PhD program, students must earn a grade of B or higher in at least four field courses.		
<i>Labor Economics Field</i>		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
<i>Industrial Organization Field</i>		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

**Elective**

Code	Title	Hours
Complete 4 semester hours from the following:		
ECON 7200 to ECON 7299		4
ECON 7976	Directed Study	

**Dissertation**

Code	Title	Hours
<b>Proposal Stage</b>		
ECON 9986	Research	
<b>Dissertation Candidacy Stage</b>		
ECON 9990	Dissertation Term 1	
ECON 9991	Dissertation Term 2	
Following completion of ECON 9990 and ECON 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.500 GPA required

**Advanced Entry Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Three qualifying examinations—microeconomics, macroeconomics, and econometrics!  
 PhD annual student progress review  
 Meet minimum 3.000 grade requirement in at least four field classes to attain doctoral degree candidacy  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense  
 Field workshop participation throughout program (and required following completion of coursework)  
 Economics Seminar Series participation throughout program

## Core Requirements

Code	Title	Hours
<b>Quantitative</b>		
ECON 7740	Applied Econometrics 2	4
<b>Theory</b>		
ECON 7710	Microeconomic Theory 2	4
ECON 7720	Macroeconomic Theory 2	4
<b>Field</b>		
<i>Labor Economics Field</i>		
ECON 7763	Labor Market Analysis	4
ECON 7764	Topics in Labor Economics	4
<i>Industrial Organization Field</i>		
ECON 7771	Framework of Industrial Organization	4
ECON 7772	Public Policy Toward Business	4

## Elective

Code	Title	Hours
Complete 4 semester hours from the following:		
ECON 7200 to ECON 7299		4
ECON 7976	Directed Study	

## Dissertation

Code	Title	Hours
<b>Proposal</b>		
ECON 9986	Research	
<b>Dissertation</b>		
Registration in the following class is required in the fall and spring semesters following achievement of doctoral candidacy:		
ECON 9990	Dissertation Term 1	
ECON 9991	Dissertation Term 2	
Following completion of ECON 9990 and ECON 9991, registration in the following class is required in each semester (including the summer if the dissertation is submitted in summer) until the dissertation is completed:		
ECON 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

32 total semester hours required  
 Minimum 3.500 GPA required

## Economics, MS

The Master of Science in Economics program focuses on applied economic policy analysis, with broad specialization areas. The program is large enough to support a full slate of core and area courses each year, yet small enough to maintain a sense of community among the students. The

program is especially appropriate for those who wish to work in or return to positions in government, teaching, finance, or industry while providing a rigorous basis for those who want to continue their studies to the doctoral level.

The Master of Science in Economics offers the opportunity for master's students to apply for paid work positions through Northeastern University's world-famous co-op program. Qualified and approved master's students can participate in co-op as practicing economists for up to six months as part of their academic program (note that a minimum GPA of 3.000 is required in order to apply). This paid work experience enhances the degree and its emphasis on application. Students have an opportunity to learn how to apply their knowledge, solve problems, and make a difference in the world before they graduate. Our graduates either find full-time work in their area of specialty or go on to earn additional graduate degrees. All of our graduates have found jobs after completing our program. For more information, please visit the Master of Science in Economics (<https://cssh.northeastern.edu/economics/program/ms-graduate-program/>) website.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Quantitative</b>		
ECON 5105 or ECON 6105	Math and Statistics for Economists Advanced Mathematics and Statistics for Economists	4
ECON 5140 or ECON 6140	Applied Econometrics Advanced Applied Econometrics	4
<b>Theory</b>		
ECON 5110 or ECON 6110	Microeconomic Theory Advanced Microeconomic Theory	4
ECON 5120 or ECON 6120	Macroeconomic Theory Advanced Macroeconomic Theory	4

### Concentration or Electives

The concentration may be taken in place of the elective section. Seattle students are required to complete the concentration.

- Data Science for Economics (p. 1050)
- Electives (p. 1051)

### OPTIONAL CO-OP EXPERIENCE

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		
ECON 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1–2

### Program Credit/GPA Requirements

32 semester hours required (33–34 with optional co-op)

Minimum 3.000 GPA required

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### CONCENTRATION IN DATA SCIENCE FOR ECONOMICS

Code	Title	Hours
<b>Required</b>		
CS 5800 or OR 6205	Algorithms Deterministic Operations Research	4
DS 5110	Introduction to Data Management and Processing	4

or IE 6700	Data Management for Analytics	
or DAMG 6210	Data Management and Database Design	
Complete 4 semester hours from the following courses:		
DS 5220	Supervised Machine Learning and Learning Theory	
or CS 6140	Machine Learning	
DS 5230	Unsupervised Machine Learning and Data Mining	
or CS 6220	Data Mining Techniques	
IE 6600	Computation and Visualization for Analytics	
IE 7275	Data Mining in Engineering	
CS 7140	Advanced Machine Learning	
<b>Economics Elective</b>		
Complete 4 semester hours from the following range:		
ECON 5200 to ECON 7772		

### ELECTIVES OPTION

With prior approval from the graduate program director, the following courses may substitute for electives: Thesis (ECON 7990) or Internship In Economics (ECON 8550). Additionally, a student may select a maximum of 8 graduate semester hours offered by other departments.

Code	Title	Hours
Complete 16 semester hours from the following range (excluding any class taken to fulfill core requirements above):		
ECON 5200 to ECON 7772		16

## English

Website (<https://cssh.northeastern.edu/english/experiential-academics/majors-minors-grad-programs/#Graduate>)

### Theo Davis, PhD

Professor and Chair  
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617.373.2509 (fax)  
gradenglish@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1031)

The graduate program in English is grounded in the study of British and American literature through the most current modes of humanistic inquiry and in the disciplines of writing and rhetoric. Both in coursework and through the NULab for Texts, Maps, and Networks (<https://web.northeastern.edu/nulab/>), the graduate program in English also offers training in the digital humanities. Altogether, our degree programs provide a challenging, flexible, and wide-ranging education in English studies today.

### Programs

#### Doctor of Philosophy (PhD)

- English (p. 1051)

#### Master of Arts (MA)

- English (p. 1054)

#### Graduate Certificate

- Digital Humanities (p. 1055)

## English, PhD

The PhD program seeks to train students to be productive scholars and teachers in the fields of both literary studies and rhetoric and composition. In course work, students read and analyze the important texts, current issues, and critical methodologies of the discipline. Drawing on the breadth of this preparation, students demonstrate their ability to recognize and produce scholarly arguments in designing the three comprehensive field papers in areas of scholarly interest and competence corresponding to recognized and emerging fields of study. Finally, the dissertation offers students

an opportunity to design a focused research project in consultation with a dissertation advisor. Throughout the program, faculty works closely with doctoral students to develop their scholarly and professional identities in preparation for careers.

## Academic Standing/Progress

To be considered in good academic standing, PhD students must be making progress toward their degree requirements, including maintaining a 3.500 minimum cumulative grade-point average (GPA) and completing the comprehensive examination within one year of finishing coursework.

## Doctoral Degree Candidacy

Students entering with a relevant BA must complete 48 semester hours; students entering with a relevant MA must complete 24 semester hours. All students must complete the language requirement, pass the comprehensive examination, and submit their approved prospectus within six months after completing the comprehensive examination to reach candidacy.

## General Regulations

Program requirements are described in the CSSH Graduate Programs General Regulations (p. 1031) and the Graduate Program in English PhD Guide (<https://cssh.northeastern.edu/english/resources/resources-for-current-grad-students/>). Both documents are updated annually.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
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## Bachelor's Degree Entrance

### Milestones

Annual progress review  
 Reading proficiency in two languages other than English  
 Comprehensive exam  
 Dissertation committee  
 Dissertation prospectus  
 Doctoral degree candidacy  
 Public prospectus/dissertation work-in-progress presentation  
 Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Proseminar</b>		
ENGL 5103	Proseminar	4
<b>Theories and Methods</b>		
Complete 4 semester hours from the following:		
ENGL 7351	Topics in Literary Study	
ENGL 7358	Topics in Literature and other Disciplines	
ENGL 7370	Introduction to Digital Humanities	
ENGL 7380	Topics in Digital Humanities	
WMNS 6100	Theorizing Gender and Sexuality	
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)	
<b>Writing and Rhetoric</b>		
Complete 4 semester hours from the following (if completing 12 semester hours of Literary Period requirements). Complete 8 semester hours of the following (if completing 8 hours of Literary Period requirements).		
ENGL 7360	Topics in Rhetoric	4-8
ENGL 7392	Writing and the Teaching of Writing	
ENGL 7395	Topics in Writing	
<b>Literary Periods</b>		
Complete 8 semester hours from TWO of the following Literary Periods (if completing 8 semester hours of Writing and Rhetoric requirements), or complete 12 semester hours from THREE of the following Literary Periods (if completing 4 semester hours of Writing and Rhetoric requirements):		

**Literature Pre-1700**

ENGL 7281	Topics in Medieval Literature
ENGL 7282	Topics in Renaissance Literature
<b>Literature 1700–1900</b>	
ENGL 7284	Topics in 18th-Century Literature
ENGL 7352	Topics in Genre
<b>Literature Post-1900</b>	
ENGL 7211	Topics in American Literature
ENGL 7244	

**Electives**

Code	Title	Hours
Complete 24 semester hours of ENGL courses, or non-ENGL courses through successful petition.		

**Dissertation**

Code	Title	Hours
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**Exam Preparation**

ENGL 8960	Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Repeatable.)
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**Research**

ENGL 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)
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**Dissertation**

ENGL 9990	Dissertation Term 1
ENGL 9991	Dissertation Term 2

**Dissertation Continuation**

Following completion of ENGL 9990 and ENGL 9991, registration in the following class is required in each fall and spring semester for all students and each summer semester for those within funding until the dissertation is completed (students outside of funding must also register in the summer semester if it is their terminal term):

ENGL 9996	Dissertation Continuation
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**Program Credit/GPA Requirements**

48 total semester hours required

Minimum 3.500 GPA required

**Advanced Entry Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Milestones**

Annual progress review

Reading proficiency in two languages other than English

Comprehensive exam

Dissertation committee

Dissertation prospectus

Doctoral degree candidacy

Public prospectus/dissertation work-in-progress presentation

Dissertation defense

**Core Requirements**

Code	Title	Hours
Proseminar		
ENGL 5103	Proseminar	4

**Electives**

Code	Title	Hours
Complete 20 semester hours of ENGL courses.		20

**Dissertation**

Code	Title	Hours
Exam Preparation		

ENGL 8960 Exam Preparation—Doctoral (Only needed for PhD students who have completed coursework but have yet to complete the comprehensive exams. Repeatable.)

**Research**

ENGL 9986 Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)

**Dissertation**

ENGL 9990	Dissertation Term 1
ENGL 9991	Dissertation Term 2

**Dissertation Continuation**

Following completion of ENGL 9990 and ENGL 9991, registration in the following class is required in each fall and spring semester for all students and each summer semester for those within funding until the dissertation is completed (students outside of funding must also register in the summer semester if it is their terminal term):

ENGL 9996	Dissertation Continuation
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**Program Credit/GPA Requirements**

24 total semester hours required  
Minimum 3.500 GPA required

**English, MA**

The Master of Arts degree launches students into the study of literature, writing, and rhetoric at the graduate level. The program offers one and a half to two years of intensive study in the major fields of British and American literature, covering the debates and approaches that animate the discipline of English. Our MA graduates are fully prepared to proceed to study at the doctoral level, and their training in critical thinking, language skills, and cultural history has also proven to be fruitful preparation for a range of careers outside of academia.

The master's program offers an optional cooperative education experience to eligible students. Co-op is central to both the Northeastern University experience and the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the co-curricular experiential integration course.

**Academic Standing/Progress**

To be considered in good academic standing, MA students must be making progress toward their degree requirements, including maintaining a 3.000 minimum cumulative grade-point average.

**General Regulations**

Program requirements are described in the CSSH Graduate Programs General Regulations (p. 1031) and the Graduate Program in English MA Guide (<https://cssh.northeastern.edu/english/resources/resources-for-current-grad-students/>). Both documents are updated annually.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Milestones

Annual progress review

Reading proficiency in a language other than English

## Core Requirements

Code	Title	Hours
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### Proseminar

ENGL 5103	Proseminar	4
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### Theories and Methods

Complete 4 semester hours from the following:	4
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ENGL 7351	Topics in Literary Study
ENGL 7358	Topics in Literature and other Disciplines
ENGL 7370	Introduction to Digital Humanities
ENGL 7380	Topics in Digital Humanities
WMNS 6100	Theorizing Gender and Sexuality
WMNS 7976	Directed Study (GCWS Consortium, selected topics only)

### Writing and Rhetoric

Complete 4 semester hours from the following (if completing 12 semester hours of literary period requirements); or complete 8 semester hours from the following (if completing 8 semester hours of literary period requirements):	4-8
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ENGL 7360	Topics in Rhetoric
ENGL 7392	Writing and the Teaching of Writing
ENGL 7395	Topics in Writing

### Literary Periods

Complete 8 semester hours from two of the following literary periods (if completing 8 semester hours of writing and rhetoric requirements); or complete 12 semester hours from three of the following literary periods (if completing 4 semester hours of writing and rhetoric requirements):	8-12
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#### Literature Pre-1700

ENGL 7281	Topics in Medieval Literature
ENGL 7282	Topics in Renaissance Literature

#### Literature 1700–1900

ENGL 7284	Topics in 18th-Century Literature
ENGL 7352	Topics in Genre

#### Literature Post-1900

ENGL 7351	Topics in Literary Study
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## Electives

Code	Title	Hours
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Complete 8 semester hours of ENGL courses, or non-ENGL courses with prior approval.

ENGL 5000-ENGL 7980	
ENGL 7990	Thesis (minimum 3.500 GPA required)

## Optional Co-op Experience

Code	Title	Hours
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Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms

ENGL 6964 and INSH 6864	Co-op Work Experience and Experiential Integration
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## Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)

Minimum 3.000 GPA required

## Digital Humanities, Graduate Certificate

The Graduate Certificate in Digital Humanities allows students to pursue an organized course of study in digital humanities with the interdisciplinary faculty of the NULab for Texts, Maps, and Networks (<https://cssh.northeastern.edu/nulab/>). This certificate can be completed both by Northeastern University doctoral and master's students in the course of their existing program of study as well as those seeking a stand-alone certificate.

Digital humanities is an emerging field of research that is interdisciplinary in scope and collaborative in nature. The field is developing in relation to new digital technologies that have changed the objects of study, methods, and opportunities for research and teaching in existing humanities fields. Digitized texts are now read and accessed in new ways; digitized corpora of texts make possible new modes of quantitative and qualitative analysis (including "distant reading," text mining, mapping, and network analysis); born digital objects constitute new primary sources in need of humanistic theorization, approaches, and critical vocabularies; and modes of encoding, aggregating, and connecting texts enable the creation of new archival resources that are changing our understanding of the archive itself as well as revealing new historical, literary, and cultural patterns.

The field is new and developing rapidly. Many students are eager for training in this area—both because DH is at the cutting edge of disciplinary work and because it offers new opportunities for employment within the academy and outside of it.

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Final Project

The student will complete a final independent DH research project located in the student's home program (such as a thesis, or a portion thereof) or participation in a collaborative DH project with substantial student participation. The final project will be overseen by the NULab faculty members teaching the NULab project seminar during its development; NULab workshop instructors will advise students on their projects and help students get guidance from other faculty as appropriate. Final projects will be submitted with three components: the project itself, a written project description of about 3,000 words, and a presentation to the NULab community. The DH certificate committee will formally approve all final projects.

## Program Requirements

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Topics/Readings/Methods</b>		
ENGL 7370 or HIST 7370	Introduction to Digital Humanities Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Lab Project Seminar</b>		
Complete the following (repeatable) course twice:		
INSH 7910	NULab Project Seminar	4

### Elective

Code	Title	Hours
Complete 4 semester hours from the following:		
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5150	Information Visualization Principles and Practices	
CS 6120	Natural Language Processing	
CS 7250	Information Visualization: Theory and Applications	
CS 7260	Visualization for Network Science	
CS 7290	Special Topics in Data Science	
ENGL 7358	Topics in Literature and other Disciplines (consult an advisor for applicable topics)	
ENGL 7380	Topics in Digital Humanities (consult an advisor for applicable topics)	
HIST 7219	Topics in Cultural History (consult an advisor for applicable topics)	
HIST 7239	Space and Place	
HIST 7250	Topics in Public History (consult an advisor for applicable topics)	
HIST 7251	Topics in American History (consult an advisor for applicable topics)	
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 5602	Documenting Fieldwork Narratives: Oral History, Ethnography, Archival Practices	
INSH 6406	Analyzing Complex Digitized Data	

JRNL 6340	Fundamentals of Digital Journalism
JRNL 6341	Telling Your Story with Data
JRNL 6355	Seminar in Investigative Reporting
POLS 7334	Social Networks
PPUA 5263	Geographic Information Systems for Urban and Regional Policy

## Program Credit/GPA Requirements

Minimum 12 total semester hours required

Minimum 3.000 GPA required

### History

Website (<https://cssh.northeastern.edu/history/>)

#### Gretchen Heefner, PhD

Professor and Chair

617.373.2662

history.department@northeastern.edu (gradhistory@northeastern.edu)

CSSH Graduate Programs General Regulations (p. 1031)

Graduate work in history focuses on global and world history. Students at both the master's and doctoral levels concentrate on the intersections and connections between national, regional, and global developments. The Department of History also offers a master's degree with a concentration in public history that emphasizes the study of material culture, historical exhibits and museums, historical agencies, and archival administration. Recent doctoral students have been the recipients of major fellowships for conducting dissertation research abroad including Fulbright, Fulbright-Hays, Social Science Research Council, and Chateaubriand fellowships.

### Programs

#### Doctor of Philosophy (PhD)

- History (p. 1057)

#### Master of Arts (MA)

- History (p. 1060)

#### Graduate Certificate

- Public History (p. 1061)

### History, PhD

The PhD program, with a focus on global, transnational, and comparative history, seeks to train research historians who plan to teach at the college and university level. Systematic training in theory and methodology and preparation for college teaching are distinctive features of the Northeastern program.

#### Academic Standing/Progress

Students are required to maintain an overall GPA of at least 3.500. In addition, the PhD annual review is based on a report by the student's advisor with attention to:

1. Success in setting up a doctoral committee
2. Passing the departmental language examination in the language of their field
3. Successful performance of teaching assistant duties
4. Successful completion of courses in the tiered system (i.e., the required course sequence)
5. Successful completion, where appropriate, of other required activities, including construction of the comprehensive examination list and the dissertation proposal and scheduling of comprehensive examinations

#### Doctoral Degree Candidacy

Students entering without an MA in history must complete 45 semester hours of coursework; pass the qualifying examination; and successfully defend a dissertation proposal by the end of the third year in the program. Students entering with an MA in history must complete 37 semester hours of coursework; pass the qualifying examination; and successfully defend a dissertation proposal by the end of the third year in the program. Upon completion of these requirements, students will be deemed PhD degree candidates by the college.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Milestones

Qualifying examination  
 Annual review  
 Language  
 PhD candidacy  
 Dissertation committee  
 Dissertation proposal  
 Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
<b>Digital History</b>		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Readings, Topics or Directed Study</b>		
Complete 20 semester hours in Readings, Topics, or Directed Study		20
HIST 5240	Feminist Resistance	
HIST 5241	Exhibits and Museums	
HIST 7219-7251 Topics		
HIST 7976	Directed Study	
HIST 8982	Readings	
<b>Research Seminar</b>		
HIST 7314	Research Seminar in World History	4
<b>Practicum</b>		
HIST 8409	Practicum in Teaching	1
<b>Electives</b>		
Code	Title	Hours
Complete 8 semester hours from the following range:		8
HIST 7200 to HIST 7702		
<b>Dissertation</b>		
Code	Title	Hours
<b>Exam Preparation</b>		
Only needed for PhD students who have completed all coursework but have not yet passed the comprehensive exam:		
HIST 8960	Exam Preparation—Doctoral	
<b>Dissertation</b>		
HIST 9990	Dissertation Term 1	
HIST 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		
Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:		
HIST 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

45 total semester hours required  
Minimum 3.500 GPA required

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Milestones

Qualifying examination  
Annual review  
Language  
PhD Candidacy  
Dissertation committee  
Dissertation proposal  
Dissertation defense

### Core Requirements

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
<b>Digital History</b>		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Readings or Directed Study</b>		
Complete 12 semester hours of either Readings or Directed Study:		
HIST 8982 or HIST 7976	Readings Directed Study	12
<b>Research Seminar</b>		
HIST 7314	Research Seminar in World History	4
<b>Practicum</b>		
HIST 8409	Practicum in Teaching	1

### Electives

Code	Title	Hours
Complete 8 semester hours from the following range:		
HIST 7200 to HIST 7702		8

### Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
Only needed for PhD students who have completed all coursework but have yet to pass the comprehensive exam. Not repeatable.		
HIST 8960	Exam Preparation—Doctoral	
<b>Dissertation</b>		
HIST 9990	Dissertation Term 1	
HIST 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		

Following completion of two semesters of HIST 9990, registration in the following class is required in each semester (excluding summers) until the dissertation is completed:

HIST 9996

Dissertation Continuation

## Program Credit/GPA Requirements

37 total semester hours required

Minimum 3.500 GPA required

### History, MA

CSSH Graduate Programs General Regulations (p. 1031)

The Master of Arts in History offers two concentrations: public history and world history.

Public history encompasses the practice of history outside the academy in museums, state and local historical societies, archives, the National Park Service, and more. Public history includes the study of such topics as material culture, historical exhibits and museums, historical agencies, archival administration, and how difficult issues including slavery and site of violence are presented to the public.

World history focuses on the history of regions or peoples in Africa, Europe, Latin America, Asia, or the United States, with attention to the intersections and connections between national, regional, and global developments.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences as practicing public historians. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

## Academic Standing/Progress

Students are expected to maintain a 3.000 grade-point average (GPA). Should the GPA drop below 3.000, the student will be placed on academic probation and allowed one more semester to bring their GPA to the 3.000 level. If the student is not able to meet this requirement by the end of the following semester, the student may be asked to leave the program.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

The Master of Arts in History offers two concentrations: world history (p. 1060) and public history (p. 1061). The program requires a concentration. Please consult with a Department of History graduate program director for additional details.

### Concentration in World History

#### CORE REQUIREMENTS

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
HIST 5102	Theory and Methodology 2	4
<b>Research Seminar</b>		
HIST 7301 to HIST 7325		4

#### ELECTIVES

Code	Title	Hours
Complete 20 semester hours from the following:		
HIST 5101 to HIST 5295		20

HIST 7205 to HIST 7218

HIST 7220 to HIST 7297

## Concentration in Public History

### CORE REQUIREMENTS

Code	Title	Hours
<b>Theory and Methodology</b>		
A grade of B or higher is required:		
HIST 5101	Theory and Methodology 1	4
<b>Public History</b>		
HIST 5237	Issues and Methods in Public History	4
<b>Digital History</b>		
HIST 7370	Texts, Maps, and Networks: Readings and Methods for Digital History	4
<b>Fieldwork</b>		
Complete the following (repeatable) course twice:		
HIST 8410	Fieldwork in History 1	4
<b>Research Seminar</b>		
Complete 4 semester hours from the following:		
HIST 7301 to HIST 7325		4
HIST 5000 to 5900		

### ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following:		
HIST 5238 to HIST 5248		12
HIST 5295 to HIST 6966		
HIST 7201 to HIST 7297		

## Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration. Each of the following courses must be taken twice.		
HIST 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	2

## Program Credit/GPA Requirements

32 total semester hours required (34 with optional co-op)

Minimum 3.000 GPA required

### Public History, Graduate Certificate

The Graduate Certificate in Public History allows students to pursue an organized course of study in public history. Students have an opportunity to gain a knowledge of core methods and issues in the field of public history and are enabled to use public history approaches in their own research and work.

Public history is a well-established field of practice that marries academic research and methods to public applications and collaborations. Public historians typically work in museums, archives, historical societies, documentary film production, and social activism, though training in public history is useful to a wide variety of humanistic, social science, and legal fields.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Issues and Methods</b>		
HIST 5237	Issues and Methods in Public History	4
<b>Fieldwork</b>		
Complete the following (repeatable) course twice:		4
HIST 8410	Fieldwork in History 1	

## Elective

Code	Title	Hours
Complete one of the following:		
HIST 5241	Exhibits and Museums	
HIST 7219	Topics in Cultural History	
HIST 7250	Topics in Public History (Sites of Violence and Public Memory)	
HIST 7250	Topics in Public History (Public History and Slavery)	

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Political Science

Website (<https://cssh.northeastern.edu/polisci/>)

Department Chair, Program Directors, and Staff Members (<https://cssh.northeastern.edu/polisci/staff-and-department-leadership/>)

CSSH Graduate Programs General Regulations (p. 1031)

Graduate training in political science prepares students to analyze important issues in world affairs and succeed in a wide array of careers—from government and academia to the nonprofit and private sectors. Graduate programs in political science, public policy, public administration, security and resilience studies, and international affairs at Northeastern University explore the theory and practice of politics, public policy, and public management in the United States and throughout the world. In teaching and research, faculty members in the department cover a broad range of topics and issues in the field of political science. Core areas of inquiry within our department include national and international security, international and U.S. public policy, resilience, network science, European studies, Middle East studies, and democratization and development.

## Programs

### Doctor of Philosophy (PhD)

- Political Science (p. 1062)

### Master of Arts (MA)

- Political Science (p. 1065)

### Master of Science (MS)

- Resilience Studies (p. 1068)
- Security and Resilience Studies (p. 1070) (*admissions to this program have been suspended*)

### Graduate Certificate

- Security and Resilience Studies (p. 1072)

### Political Science, PhD

The Doctor of Philosophy in Political Science is grounded in the core fields of the discipline—American government and politics, comparative politics, international relations, and public policy. Students identify a primary and secondary field as areas of emphasis. The curriculum introduces students to the core fields and also seeks to develop their research skills through a series of methods courses. Students may develop a traditional, academic focus in one of the fields, or they may combine it with public policy to highlight a policy orientation. The program focuses on preparing students to be academic scholars and teachers as well as practitioners in research and public service. The PhD degree includes completion of required courses, passing a written and oral comprehensive examination, and the successful defense of the dissertation before a faculty committee.

## Credit Requirements and Advanced Standing

Students entering with a bachelor's degree must complete 56 semester hours. Students currently in the MA or MPA program and accepted into the PhD program before completing the MA or MPA must complete 56 semester hours as well as all curriculum requirements of the PhD program.

Students entering with a master's degree may receive advanced standing for relevant prior coursework but must complete a minimum of 40 semester hours. Students entering with a Northeastern MA in political science or international affairs must complete a minimum of 24 semester hours while also satisfying all PhD course requirements. Master's-level coursework that results in advanced standing is evaluated by the graduate program director to determine its applicability to the PhD curriculum.

## Doctoral Degree Candidacy

Doctoral degree candidacy is attained after successfully completing all coursework, comprehensive examination, and the dissertation proposal defense.

## Academic Standing/Progress

All doctoral students must maintain an overall cumulative grade-point average (GPA) of 3.500 while making progress toward the degree requirements. Students who fall below any applicable standard for two consecutive semesters are subject to dismissal from the graduate program. Additionally, receipt of financial support administered by the department, college, or university is contingent on satisfactory academic progress toward the degree and specific guidelines as published in the terms of award. Students who have ungraded courses or courses graded as incomplete risk no longer being eligible for financial aid awards.

## Language Proficiency

Students who conduct research in a language other than English must demonstrate proficiency as necessary for completion of the dissertation. Language courses do not count as electives.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Comprehensive examination  
Dissertation committee  
Dissertation proposal  
Dissertation proposal oral defense  
Language (as determined by committee)  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Seminars</b>		
POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	
<b>Inquiry and Design</b>		
INSH 6300	Research Methods in the Social Sciences	4
<b>Quantitative Techniques</b>		
INSH 6500	Statistical Analysis	4

INSH 7400	Quantitative Analysis	4
Advanced methods courses from other disciplines may be chosen in consultation with your faculty advisor.		

## Electives

Courses from other disciplines may be chosen in consultation with your faculty advisor.

Code	Title	Hours
Complete 32 semester hours in the following:		32
POLS 7200 to POLS 7990		

## Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
POLS 8960	Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam. Required for students who must maintain full-time status while completing thesis or comprehensive exam.)	
<b>Research</b>		
POLS 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	
<b>Dissertation</b>		
POLS 9990	Dissertation Term 1	
POLS 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		
POLS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

56 total semester hours required  
Minimum 3.500 GPA required

## Advanced Entry Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below.

## Milestones

Annual review  
Comprehensive examination  
Dissertation committee  
Dissertation proposal  
Dissertation proposal oral defense  
Language (as determined by committee)  
PhD candidacy  
Dissertation defense

## Core Requirements

Consult the graduate program director regarding which major-required courses apply to your individual plan of study.

Code	Title	Hours
<b>Seminar</b>		
Complete 12 semester hours from the following: <sup>1</sup>		12

POLS 7204	Seminar in Public Policy	
POLS 7205	Seminar in American Government and Politics	
POLS 7206	Seminar in Comparative Politics	
POLS 7207	Seminar in International Relations	
<b>Inquiry and Design</b>		
INSH 6300	Research Methods in the Social Sciences	4
<b>Quantitative Techniques</b>		
INSH 6500 or INSH 7400	Statistical Analysis Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4
Advanced methods courses from other disciplines may be chosen in consultation with your faculty adviser.		

## Electives

Code	Title	Hours
	Complete 0-16 semester hours in the following. Courses from other disciplines may be chosen in consultation with your faculty adviser.	0-16
POLS 7200 to POLS 7990		

## Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
POLS 8960		
Exam Preparation—Doctoral (Only required for PhD students who have completed coursework but have yet to complete the comprehensive exam.)		
<b>Research</b>		
POLS 9986	Research (To be completed during the proposal/prospectus phase prior to reaching candidacy.)	0
<b>Dissertation</b>		
POLS 9990	Dissertation Term 1	
POLS 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		
POLS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

24-40 total semester hours required  
Minimum 3.500 GPA required

<sup>1</sup> You must complete both field seminars in the two areas you wish to take the comprehensive exams in.

## Political Science, MA

Graduate Studies in Political Science  
617.373.4404  
gradpolisci@northeastern.edu

CSSH Graduate Programs General Regulations (p. 1031)

The Master of Arts program focuses on the core scholarly areas of political science. Students specialize in one of five concentration areas: American government and politics, comparative politics, international relations, public policy, and security studies. Courses in the MA program serve as a foundation for work in a doctoral program or as preparation for careers in government, nonprofit organizations, or related work in the private sector.

To earn the Master of Arts in Political Science degree at Northeastern University, you must successfully complete 32 semester hours (typically eight courses) of credit. Full-time students can expect to complete the degree within two academic years. Coursework consists of 4 semester hours in a required statistics course, 12 semester hours within a chosen concentration, and 16 semester hours of electives (including the experiential education requirement). To see the full breakdown, click the Program Requirements tab above.

## Academic Standing/Progress

Satisfactory progress in the MA program includes maintaining a grade-point average of 3.000 overall as well as in the student's concentration area. A final cumulative GPA of at least 3.000 in all coursework is required to qualify for the Master of Arts degree. Any course in which a student earns lower than a C grade cannot be used to fulfill concentration area requirements. A student who fails to make satisfactory progress is placed on academic probation, which is a warning that the student may not be allowed to continue in the graduate program unless the deficiency is addressed.

## Experiential Learning Requirement

In addition to in-class coursework, students are required to complete an experiential education component that advances their learning, research, and/or career objectives. Experiential education offers MA students a direct experience with focused reflection relevant to their academic studies. For students with research interests, the experience focuses on related activities, such as primary source analysis and data gathering. For other students, the experience involves engagement with areas of practice and policy, such as an internship. Students register for the relevant course with a minimum of 4 semester hours and maximum of 8 semester hours to satisfy the experiential education requirement.

An optional cooperative education experience can also satisfy the experiential education requirement. Co-op education is central to both the Northeastern experience and to the College of Social Sciences and Humanities Experiential Liberal Arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirement

Code	Title	Hours
<b>Methods Course</b>		
Complete 4 semester hours from the following:		4
CS 6220	Data Mining Techniques	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

### Concentrations

- American Government and Politics (p. 1067)
- Comparative Politics (p. 1067)
- International Relations (p. 1067)
- Public Policy (p. 1068)
- Security Studies (p. 1068)

### Electives

Code	Title	Hours
Complete 12 semester hours in the following range:		
POLS 5408 to POLS 7976		12

### Experiential Learning Component

Code	Title	Hours
Complete 4 semester hours from the following:		
POLS 7976	Directed Study	4
POLS 7980	Capstone Project	

POLS 7990	Thesis	
POLS 8407	Internship	

### Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		
POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1–2

### Program Credit/GPA Requirements

32 total semester hours required (33–34 with optional co-op)

Minimum 3.000 GPA required

### AMERICAN GOVERNMENT AND POLITICS CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
POLS 7205	Seminar in American Government and Politics	4
<b>American Government Courses</b>		
Complete 8 semester hours from the following:		
POLS 7341	Security and Resilience Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 5270	Food Systems and Public Policy	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6522	Administrative Ethics and Public Management	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

### COMPARATIVE POLITICS CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
POLS 7206	Seminar in Comparative Politics	4
<b>Comparative Politics Courses</b>		
Complete 8 semester hours from the following:		
POLS 7325	Contemporary Issues in Third World Development	
PPUA 5246 or PPUA 7346	Resilient Cities	
POL 7366	Resilient Cities	
POL 7366	Genocide in a Comparative Perspective	
PPUA 5240	Health Policy and Politics	
PPUA 5266	Urban Theory and Science	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	

### INTERNATIONAL RELATIONS CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
POLS 7207	Seminar in International Relations	4
<b>International Relations Courses</b>		
Complete 8 semester hours from the following:		
POLS 7341	Security and Resilience Policy	8

POLS 7343	Counterterrorism
POLS 7344	Hard Power, Soft Power, and Smart Power
POLS 7369	International Security
POLS 7387	Global Governance

**PUBLIC POLICY CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
POLS 7204 or PPUA 6506	Seminar in Public Policy Techniques of Policy Analysis	4
<b>Public Policy Courses</b>		
Complete 8 semester hours from the following:		
POLS 7341	Security and Resilience Policy	
PPUA 5240	Health Policy and Politics	
PPUA 5245	Education Policy in the United States	
PPUA 6500	Principles of Public Administration	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	

**SECURITY STUDIES CONCENTRATION**

Code	Title	Hours
<b>Security Studies Courses</b>		
POLS 7341	Security and Resilience Policy	4
Complete 8 semester hours from the following:		
POLS 7207	Seminar in International Relations	
POLS 7343 to POLS 7346		
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	
POLS 7387	Global Governance	

**Resilience Studies, MS**

Resilience studies is an emerging field of inquiry that focuses on how global, national, and subnational actors manage a range of chronic transnational challenges—such as terrorism, organized crime, weapons proliferation, cyberattacks, bioterrorism, climate change and catastrophic disasters, migration, and radicalization—that can be destabilizing to societies. It explores how strategic doctrines, organization processes, bureaucratic behaviors, and security tools and tactics are adapting to these challenges by placing greater emphasis on resilience. Resilience is a concept rooted in multiple disciplines that is gaining widespread currency at the community, societal, and global levels given the prevalence of human-made and naturally occurring threats that do not lend themselves to preventive and protective measures. Strategies for dealing with these threats emphasize measures that mitigate, respond to, recover from, and adapt to risk in order to safeguard essential functions and societal values. Many of these measures involve the role of technologies, system design, and engineering as well as policy, regulatory, and governance issues. Students at Northeastern University who enroll in the Master of Science in Resilience Studies have an opportunity to become prepared to inform and support domestic and international efforts to deal with the major sources of turbulence in the 21st century.

The master's program offers an optional cooperative education experience to eligible students. Co-op is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

To earn the Master of Science in Resilience Studies degree at Northeastern, you must successfully complete 32 semester hours (or 33–34 semester hours with co-op). Full-time students can expect to complete the degree within one calendar year. Cost per semester hour may vary based on the college that offers the course. See Tuition and Fees (p. 150) for more information.

**Academic Standing/Progress**

Satisfactory progress in the MS program includes maintaining a minimum grade-point average of 3.000.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

### Core Requirements

Code	Title	Hours
<b>Required Courses</b>		
POLS 7341	Security and Resilience Policy <sup>1</sup>	4
POLS 7346 or PPUA 7346	Resilient Cities	4
<b>Research Methods</b>		
Complete one of the following:		4
CRIM 5270	Crime Mapping	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

### Electives

Code	Title	Hours
Complete 16 semester hours from any combination of the following:		
POLS 7343	Counterterrorism	
POLS 7369	International Security	
PPUA 5100	Climate and Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5267	Climate Policy and Justice	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	
PPUA 6503	Managing People in Public and Nonprofit Sectors	
PPUA 6532	Building Resilience into Local Government	
SCHM 6201	Operations and Supply Chain Management	

### Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		
POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1-2

### Program Credit/GPA Requirements

32 total semester hours (33–34 with optional co-op) required

Minimum 3.000 GPA required

<sup>1</sup> Occasional online offering

## Security and Resilience Studies, MS

### Overview

Admissions to this program have been suspended. Students previously admitted to this program may complete this program or apply to change to the successor MS Resilience Studies (p. 1068) program.

Security and resilience studies is an emerging field of inquiry that focuses on how global, national, and subnational actors manage a range of chronic transnational challenges—such as terrorism, organized crime, weapons proliferation, cyberattacks, bioterrorism, climate change and catastrophic disasters, migration, and radicalization—that can be destabilizing to societies. It explores how strategic doctrines, organization processes, bureaucratic behaviors, and security tools and tactics are adapting to these challenges by placing greater emphasis on resilience. Resilience is a concept rooted in multiple disciplines that is gaining widespread currency at the community, societal, and global levels given the prevalence of human-made and naturally occurring threats that do not lend themselves to preventive and protective measures. Strategies for dealing with these threats emphasize measures that mitigate, respond to, recover from, and adapt to risk in order to safeguard essential functions and societal values. Many of these measures involve the role of technologies, system design, and engineering as well as policy, regulatory, and governance issues. Students at Northeastern who enroll in the Master of Science in Security and Resilience Studies have an opportunity to become prepared to inform and support domestic and international efforts to deal with the major sources of turbulence in the 21st century.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

To earn the Master of Science in Security and Resilience Studies degree at Northeastern, you must successfully complete 32 semester hours (34 semester hours with co-op). Full-time students can expect to complete the degree within one calendar year. This program can be completed either at Northeastern University's Boston campus or online. Cost per semester hour may vary based on the college that offers the course. See Tuition and Fees (p. 150) for more information.

### Academic Standing/Progress

Satisfactory progress in the MS program includes maintaining a minimum grade-point average of 3.000.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Required Core Courses</b>		
POLS 7341	Security and Resilience Policy <sup>1</sup>	4
<b>Research Method</b>		
INSH 6300 or INSH 6500 or PPUA 5263	Research Methods in the Social Sciences Statistical Analysis Geographic Information Systems for Urban and Regional Policy	4
<b>Core Elective Courses</b>		
Complete 8 semester hours from the following:		
CRIM 6200	Criminology <sup>1</sup>	8
CY 5010	Cybersecurity Principles and Practices <sup>1</sup>	
POLS 7343	Counterterrorism	
POLS 7346 or PPUA 7346	Resilient Cities Resilient Cities	
POLS 7369	International Security	

or POLS 5408	International Security	
POLS 7441		
PPUA 5390	Special Topics in Public Policy and Urban Affairs <sup>1</sup>	
<b>Capstone</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
Choose one of the following options in consultation with faculty advisor and program director:		
POLS 7980	Capstone Project <sup>1</sup>	4
or PPUA 7673	Capstone in Public Policy and Urban Affairs	

## Electives

Electives are organized by themes to allow students to think thematically.

<b>Code</b>	<b>Title</b>	<b>Hours</b>
Complete 12 semester hours from any combination of the following elective themes:		
• Administration, Management, and Policy (p. 1071)		
• Counterterrorism and Conflict Studies (p. 1071)		
• Criminal Justice (p. )		
• Cybersecurity Policy (p. 1071)		
• Resilient Cities (p. 1072)		

## ADMINISTRATION, MANAGEMENT, AND POLICY

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CRIM 6202	The Criminal Justice Process	
POLS 7387	Global Governance	
POLS 7704	1	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6503	Managing People in Public and Nonprofit Sectors <sup>1</sup>	
PPUA 6505	Public Budgeting and Financial Management <sup>1</sup>	
PPUA 6506	Techniques of Policy Analysis <sup>1</sup>	
PPUA 6507	Institutional Leadership and the Public Manager <sup>1</sup>	

## COUNTERTERRORISM AND CONFLICT STUDIES

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CRIM 5201	Global Criminology	
POLS 7343	Counterterrorism	
POLS 7344	Hard Power, Soft Power, and Smart Power	
POLS 7366	Genocide in a Comparative Perspective	
POLS 7369	International Security	
or POLS 5408	International Security	

## CRIMINAL JUSTICE

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CRIM 5201	Global Criminology	
CRIM 6200	Criminology <sup>1</sup>	
CRIM 6202	The Criminal Justice Process	
CRIM 6262	Evidence-Based Crime Policy	

## CYBERSECURITY POLICY

<b>Code</b>	<b>Title</b>	<b>Hours</b>
CY 5001	Cybersecurity: Technologies, Threats, and Defenses	
CY 5010	Cybersecurity Principles and Practices	
CY 5200	Security Risk Management and Assessment	
CY 5210	Information System Forensics	
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
CY 5250	Decision Making for Critical Infrastructure	

## 1072 Security and Resilience Studies, Graduate Certificate

PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	
POLS 7441	1	

### RESILIENT CITIES

Code	Title	Hours
CRIM 6200	Criminology	
CRIM 6262	Evidence-Based Crime Policy	
CRIM 6270	Crime and Community Context	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7346	Resilient Cities	
or PPUA 7346	Resilient Cities	
POLS 7704	1	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities <sup>1</sup>	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5266	Urban Theory and Science	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

### Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms.		1-2
POLS 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

### Program Credit/GPA Requirements

32 total semester hours (33-34 with optional co-op) required

Minimum 3.000 GPA required

<sup>1</sup> Occasional online offering

## Security and Resilience Studies, Graduate Certificate

The goal of the Graduate Certificate in Security and Resilience Studies is to prepare students to manage contemporary transnational risks by offering them an opportunity to gain a comprehensive understanding of the principles and policies for security and resilience of critical systems. This goal is achieved by:

- Passing a core course in security and resilience policy that introduces students to a comprehensive approach to managing transnational risks
- Passing recommended foundation courses for cyberspace policy, security administration, and counterterrorism specializations that provide a broad perspective on transnational threats and the means states use to address them
- Learning how to work with others in groups and exercise leadership in teams by completing group assignments and projects

The certificate requires students to take three courses for a total of 12 semester hours. This program can be completed at Northeastern University's Boston campus or online.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirement**

Code	Title	Hours
POLS 7341	Security and Resilience Policy	4

**Electives**

Code	Title	Hours
Complete 8 semester hours from the following:		8
CRIM 6200	Criminology	
POLS 7343	Counterterrorism	
POLS 7346	Resilient Cities	
POLS 7369 or POLS 5408	International Security	
PPUA 5390	Special Topics in Public Policy and Urban Affairs	

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

**School of Public Policy and Urban Affairs**Website (<https://cssh.northeastern.edu/policyschool/>)**Maria Ivanova, PhD**Director, School of Public Policy and Urban Affairs  
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617.373.8900  
617.373.7905 (fax)  
sppua@northeastern.edu

The School of Public Policy and Urban Affairs is nationally and internationally recognized for excellence and innovation in policy-oriented education, applied research, and engagement. Our mission is to educate professional master's and doctoral students who are sought after as policy analysts, program evaluators, and leaders of nonprofit, public, private sector, and academic institutions; to create and disseminate policy-relevant knowledge and analytical methods of value to policymakers and the public; and to serve the broader community through policy analysis and technical assistance.

The school is committed to excellence in research and education on pressing and emerging policy issues of the day—public health, climate change, environmental challenges, the court and justice systems, and creating sustainable and resilient cities that provide economic opportunity for their residents. We define our approach as locally informed and internationally relevant. Our hallmark is to engage students in building the world that they would like to live in through experiential learning opportunities and applied research.

**Programs****Doctor of Philosophy (PhD)**

- Public Policy (p. 1074)

**Master of Arts (MA)**

- International Affairs (p. 1079)

**Master of Public Administration (MPA)**

- Public Administration (p. 1081)

**Master of Public Policy (MPP)**

- Public Policy (p. 1083)

**Master of Science (MS)**

- Engineering and Public Policy (p. 448)
- Environmental Science and Policy (p. 968)
- Urban Informatics (p. 1090)
- Urban Planning and Policy (p. 252)

## Dual Degree

- Law, JD/Public Policy, MPP (p. 829)

## Graduate Certificates

- Nonprofit Sector, Philanthropy, and Social Change (p. 1097)
- Public Policy Analysis (p. 1098)
- Sustainability and Climate Change Policy (p. 1099)
- Urban Analytics
- Urban Studies (p. 1101)

## Public Policy, PhD

Website (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1031)

The PhD in Public Policy is an interdisciplinary program that combines social science and legal theoretical perspectives with quantitative and qualitative research methodologies. The faculty in the School of Public Policy and Urban Affairs support students' research and dissertations in three broad areas of inquiry—urban and regional policy, sustainability and resilience, and health management and policy. Students work with faculty advisors to formulate a plan of study within their field of concentration by choosing from graduate programs offered in the School of Public Policy and Urban Affairs, the College of Social Sciences and Humanities, and in other colleges and schools at Northeastern University. Students study a common body of knowledge in core courses in policy theory, research methods, and statistics, followed by courses in each student's respective concentration. The school's research centers and faculty research projects provide opportunities for students to develop insight, experience, and synergies to help with their own research goals. The college and school offer a high level of support allowing all students to be devoted full time to their studies and research. The program is full time and in residence only.

## Doctoral Degree Candidacy

Complete all required coursework with a minimum 3.500 grade-point average, pass the comprehensive examinations, and defend a dissertation proposal. Students entering without a JD or master's degree must complete 55 semester hours. Students entering with a JD or master's degree must complete 47 semester hours.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Comprehensive examination  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

A grade of B+ or higher is required in each course.

Code	Title	Hours
Seminar		
PPUA 7204	Seminar on Policy Theory	4
Complete the following two courses for a minimum of 4 semester hours total:		
PPUA 7976	Directed Study	4
PPUA 9984	Research	
<b>Research and Statistical Methods</b>		

INSH 6300	Research Methods in the Social Sciences	4
INSH 6302	Qualitative Methods	4
INSH 7400	Quantitative Analysis	4
<b>Advanced Methods</b>		
	Complete one of the following (an additional concentration elective may be taken in lieu of the advanced methods elective):	4
INSH 7500 or INSH 7600	Advanced Quantitative Analysis Multilevel Theorizing and Analysis	

## Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

## Concentrations

Complete one of the following concentrations:

- Health Policy and Management (p. 1075)
- Sustainability and Resilience (p. 1076)
- Urban and Regional Policy (p. 1076)

## Exam and Dissertation

Code	Title	Hours
<b>Exam Prep</b>		
PPUA 8960	Exam Preparation—Doctoral	
<b>Dissertation</b>		
PPUA 9990	Dissertation Term 1	
PPUA 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		
PPUA 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

55 total semester hours required

Minimum 3.500 GPA required

## HEALTH POLICY AND MANAGEMENT CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
PPUA 5220	How Healthcare Works: Business and Policy Innovations	4
<b>Health Organization</b>		
HRMG 6220	Health Organization Management	3
<b>Business Elective</b>		
Complete 3 semester hours from the following:		3
FINA 6220	Healthcare Finance	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	
<b>Law Requirement</b>		
LW 7335	Health Law	3
<b>Electives</b>		
Complete a minimum of 18 semester hours from the following:		18
ECON 7200	Topics in Applied Economics	

LPSC 7311	Strategizing Public Policy
PPUA 5240	Health Policy and Politics
PPUA 6509	Techniques of Program Evaluation
SOCL 7267	Environment, Health, and Society
PHTH 6000–9999 (public health elective, by advisement)	

**SUSTAINABILITY AND RESILIENCE CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
PPUA 6101 Environmental Science and Policy Seminar 1		
<b>Law Requirement</b>		
LW 7329 Environmental Law		
<b>Electives</b>		
Complete 24 semester hours from the following:		
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7341	Security and Resilience Policy	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

**URBAN AND REGIONAL POLICY CONCENTRATION**

Code	Title	Hours
<b>Seminar</b>		
PPUA 7521 Seminar in Urban Theory		
<b>Law Requirement</b>		
Consult an advisor when selecting courses from the following:		
LW 6000–9999		
<b>Electives</b>		
Complete 24 semester hours from the following:		
ARCH 5210	Environmental Systems	
CRIM 6270	Crime and Community Context	
ECON 7240	Workshop in Applied Econometrics	
ECON 7250	International Economic Development	
ECON 7266	Economics of Government	
ECON 7270	Economics of Law and Regulation	
ECON 7740	Applied Econometrics 2	
ECON 7763	Labor Market Analysis	
LPSC 7311	Strategizing Public Policy	
POLS 7325	Contemporary Issues in Third World Development	
POLS 7334	Social Networks	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7976	Directed Study	
SOCL 7221	Globalization, Development, and Social Justice	
SOCL 7227	Race and Ethnic Relations	

**Advanced Entry Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Comprehensive examination  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

A grade of B+ or higher is required in each course.

Code	Title	Hours
<b>Seminar</b>		
PPUA 7204	Seminar on Policy Theory	4
Complete the following two courses for a minimum of 4 semester hours total:		
PPUA 7976	Directed Study	4
PPUA 9984	Research	
<b>Research and Statistical Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6302	Qualitative Methods	4
INSH 7400	Quantitative Analysis	4
<b>Advanced Methods</b>		
Complete one of the following (an additional concentration elective may be taken in lieu of the advanced methods elective):		
INSH 7500 or INSH 7600	Advanced Quantitative Analysis Multilevel Theorizing and Analysis	4

## Experiential Research Residency

A PhD research residency or waiver is required.

Code	Title	Hours
PPUA 9980	Experiential PhD Research Residency	0

## Concentrations

Complete one of the following concentrations:

- Health Policy and Management (p. 1075)
- Sustainability and Resilience (p. 1076)
- Urban and Regional Policy (p. 1076)

## Exam and Dissertation

Code	Title	Hours
<b>Exam Prep</b>		
PPUA 8960	Exam Preparation—Doctoral	
<b>Dissertation</b>		
PPUA 9990	Dissertation Term 1	
PPUA 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		

Following completion of PPUA 9990 and PPUA 9991, registration in the following class is required in each semester (including summer if the dissertation is submitted in summer) until the dissertation is completed:

PPUA 9996 Dissertation Continuation

## Program Credit/GPA Requirements

47 total semester hours required

Minimum 3.500 GPA required

### HEALTH POLICY AND MANAGEMENT CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
PPUA 5220	How Healthcare Works: Business and Policy Innovations	4
<b>Health Organization</b>		
HRMG 6220	Health Organization Management	3
<b>Business Elective</b>		
Complete 3 semester hours from the following:		3
FINA 6220	Healthcare Finance	
SCHM 6223	Managing Healthcare Supply Chain Operations	
STRT 6220	Strategic Management for Healthcare Organizations	
<b>Law Requirement</b>		
LW 7335	Health Law	3
<b>Electives</b>		
Complete a minimum of 10 semester hours from the following:		10
ECON 7200	Topics in Applied Economics	
LPSC 7311	Strategizing Public Policy	
PPUA 5240	Health Policy and Politics	
PPUA 6509	Techniques of Program Evaluation	
SOCL 7267	Environment, Health, and Society	
PHTH 6000 to PHTH 9999 (public health elective, by advisement)		

### SUSTAINABILITY AND RESILIENCE CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
<b>Law Requirement</b>		
LW 7329	Environmental Law	3
<b>Electives</b>		
Complete 16 semester hours from the following:		16
CIVE 7110	Critical Infrastructure Resilience	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
POLS 7341	Security and Resilience Policy	
PPUA 6509	Techniques of Program Evaluation	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
PPUA 7346	Resilient Cities	
PPUA 7976	Directed Study	
SOCL 7267	Environment, Health, and Society	

### URBAN AND REGIONAL POLICY CONCENTRATION

Code	Title	Hours
<b>Seminar</b>		
PPUA 7521	Seminar in Urban Theory	4
<b>Law Requirement</b>		
Consult an advisor when selecting courses from the following:		3

LW 6000 to LW 9999

**Electives**

Complete 16 semester hours from the following:

16

ARCH 5210	Environmental Systems
CRIM 6270	Crime and Community Context
ECON 7240	Workshop in Applied Econometrics
ECON 7250	International Economic Development
ECON 7266	Economics of Government
ECON 7270	Economics of Law and Regulation
ECON 7740	Applied Econometrics 2
ECON 7763	Labor Market Analysis
LPSC 7311	Strategizing Public Policy
POLS 7325	Contemporary Issues in Third World Development
POLS 7334	Social Networks
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context
PPUA 6509	Techniques of Program Evaluation
PPUA 7237	Advanced Spatial Analysis of Urban Systems
PPUA 7976	Directed Study
SOCL 7221	Globalization, Development, and Social Justice
SOCL 7227	Race and Ethnic Relations

**International Affairs, MA**School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

We live in an increasingly interconnected global environment where people, goods, ideas, and conflicts traverse borders with rising frequency. Leaders in the activist, policy, and academic spheres must learn not only how to critically analyze these phenomena but also to envisage harnessing their constructive potential. The Master of Arts in International Affairs is an interdisciplinary graduate program dedicated to preparing tomorrow's global citizens.

A holistic approach to enhancing our understanding of the world must span the limits of any one academic field and embrace cross-disciplinary analytical competencies. Spanning several social sciences and humanities, our courses are taught by leading scholars who research democratization, gender, globalization, ethnic conflict and cooperation, human rights and international law, international relations, social activism, social justice, and many other topics. Through its core courses, its two thematic emphases—globalization, development, and social justice and international public policy—as well as global, policy, and methodological electives, this graduate program allows students to pursue a variety of themes.

The master's program offers an optional cooperative education experience ("co-op") to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (p. 150) page as credit costs differ depending on the College in which the course is located.

**Sustainability and Climate Change Policy Concentration**

This graduate concentration is available to students in the Master of International Affairs (MIAF) program in the College of Social Sciences and Humanities. It is designed to enable MIAF students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, and in both domestic and international domains. The concentration is comprised of three courses.

CSSH Graduate Programs General Regulations (p. 1031)

**Academic Standing/Progress**

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Political Economy</b>		
Complete 8 semester hours from the following:		
POLS 7387	Global Governance	8
PPUA 5268	International Environmental Policy	
SOCL 7221	Globalization, Development, and Social Justice	
<b>Social Science Methods</b>		
Complete 4 semester hours from the following:		
ECON 5110	Microeconomic Theory	4
ECON 5120	Macroeconomic Theory	
ECON 7251	International Finance	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 6302	Qualitative Methods	
<b>Public Policy</b>		
Complete 4 semester hours from the following:		
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 6506	Techniques of Policy Analysis	
PPUA 6507	Institutional Leadership and the Public Manager	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6551	Nonprofit Organizations and Social Change	

## Concentrations or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Sustainability and Climate Change Policy (p. 1080)
- Electives (p. 1081)

## Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms.		
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1-2

## Program Credit/GPA Requirements

36 total semester hours required (37-38 with optional co-op)

Minimum 3.000 GPA required

## SUSTAINABILITY AND CLIMATE CHANGE POLICY CONCENTRATION

Code	Title	Hours
Complete 12 semester hours from the following course list:		
ENVR 6150	Food Security and Sustainability	12
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	

PPUA 5249	Sustainable Urban Coastal Policy
PPUA 5260	Ecological Economics
PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5268	International Environmental Policy
PPUA 5270	Food Systems and Public Policy
PPUA 6101	Environmental Science and Policy Seminar 1

Complete 8 semester hours of elective courses from the list below:

8

### ELECTIVES OPTION

Selected in consultation with faculty advisor.

Code	Title	Hours
Complete 20 semester hours from the following list of courses:		
INTL 7990	Thesis	20
LPSC 5000 to LPSC 7999		
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

## Public Administration, MPA

Website (<https://publicaffairs.northeastern.edu/master-of-public-administration/>)

CSSH Graduate Programs General Regulations (p. 1031)

The Master of Public Administration is the management and leadership degree for those seeking to serve the public good. The program seeks to equip its students with skills in policy analysis, program evaluation, research methods, and written and verbal communications.

Students have an opportunity to develop competencies in budgeting and human resources, organizational management and leadership, and the interplay between ethics and accountability in a diverse society.

Throughout the degree program, students gain career-oriented experience through internships, small group projects, and other interactions with professionals in the field. These experiences are designed to enable the Northeastern University MPA graduate to move into a wide array of public and nonprofit sector positions at the local, state, national, and international levels. The Northeastern MPA program is nationally accredited by NASPAA.

### Mission Statement

The mission of the MPA program at Northeastern is to serve the needs of the public affairs community, including students, working professionals, faculty, and researchers, by providing a practice-oriented and research-based graduate educational experience. The faculty pledges the best instruction available in a set of courses designed to integrate theoretical foundations with practical skills. The MPA program is designed to prepare students to be effective in a dynamic and increasingly diverse professional environment. We also commit ourselves to assisting students in every possible way to secure internships, postgraduate employment, and overall career advancement. Students, in turn, are expected to meet high levels of academic excellence combined with ethical and professional integrity. Committed to the ideals of public service and advancing the public interest, we seek students who share the same enthusiasm.

The MPA program requires all students to pursue an internship experience and offers an optional cooperative education experience to eligible students. Co-op is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

### Healthcare Management and Policy Concentration

This graduate concentration is available to students in the MPA program in the School of Public Policy and Urban Affairs. It is designed to enable students in the MPA program to develop a deeper understanding of the contemporary healthcare sector, including the intricacies of U.S. health policy, and competencies in healthcare management. The concentration is comprised of three courses, one from each of three focus areas, and an elective.

Please review the tuition and fees (<https://studentfinance.northeastern.edu/billing-payments/tuition-and-fees/>) page as credit costs differ depending on the college that offers the course.

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose cumulative GPA falls below 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

A cumulative 3.000 grade-point average is required for the core requirements.

Code	Title	Hours
<b>Quantitative Techniques</b>		
INSH 6500	Statistical Analysis	4
<b>Analysis</b>		
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 6506	Techniques of Policy Analysis	4
<b>Administration and Management</b>		
PPUA 6500	Principles of Public Administration	4
PPUA 6505	Public Budgeting and Financial Management	4
PPUA 6507	Institutional Leadership and the Public Manager	4
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4

### Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

### Concentration or Electives Option

A concentration is not required. Students may complete electives (from the elective list below) in lieu of a concentration.

- Healthcare Management and Policy (p. 1082)
- Electives (p. 1083)

### Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms. Both of the following courses must be taken during each co-op semester:		
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	2

### Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)

Minimum 3.000 GPA

### HEALTHCARE MANAGEMENT AND POLICY CONCENTRATION

Code	Title	Hours
<b>Health Management</b>		
Complete one of the following:		3-4

HRMG 6220	Health Organization Management	
PPUA 5220	How Healthcare Works: Business and Policy Innovations	
STRT 6220	Strategic Management for Healthcare Organizations	
<b>Health Policy</b>		
Complete one of the following:		3-4
PHTH 5212	Public Health Administration and Policy	
PHTH 5234	Economic Perspectives on Health Policy	
PPUA 5240	Health Policy and Politics	
<b>Electives</b>		
<i>Health Elective</i>		
Complete one of the following:		3
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5230	Global Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
<i>General Elective</i>		
Complete an additional course from the health elective list above or one of the following:		2-3
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	

### ELECTIVES OPTION

Code	Title	Hours
Complete 12 semester hours from the following:		
CRIM 5000 to CRIM 7999 (by advisement only)		12
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
LPSC 5000 to LPSC 7999		
POLS 5000 to POLS 7999 (by advisement only)		
PPUA 5000 to PPUA 7999		
SOCL 5000 to SOCL 7999 (by advisement only)		

### Public Policy, MPP

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1031)

The Master of Public Policy is the recognized industry standard for those seeking careers in public policy analysis and design. The MPP degree emphasizes the analysis of data and other relevant information to enable graduates to assess public problems, develop appropriate policy responses, and evaluate program effectiveness. MPP graduates enter careers as policy analysts, researchers, consultants, program evaluators, and policymakers in a broad range of public and nonprofit settings, ranging from the local to the international, and in the private sector. At Northeastern University, the MPP joins the nationally accredited Master of Public Administration as well as our Master of Science in Urban Planning and Policy, Master of Science in Urban Informatics, Master of Science in Environmental Science and Policy, and Master of Arts in International Affairs. As such, MPP students are part of a larger School of Public Policy and Urban Affairs community of great intellectual and policy area diversity.

The MPP programs require all students to engage in an internship experience and offer an optional cooperative education experience to eligible students. Cooperative education is central to both the Northeastern experience and to the experiential liberal arts framework of the College of Social Sciences and Humanities. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States.

## Healthcare Management and Policy Concentration

This concentration is designed to enable students to develop a deeper understanding of the contemporary healthcare sector, including the intricacies of U.S. health policy, and competencies in healthcare management. The concentration is comprised of three courses, one from each of three focus areas, and an elective.

## Sustainability and Climate Change Policy Concentration

This graduate concentration is available to students in the MPP program in the College of Social Sciences and Humanities. It is designed to enable MPP students to develop deeper insights into the policy dimensions of these intertwined but conceptually distinct realms of inquiry and action, in both domestic and international domains. The concentration is comprised of three courses.

Please review the tuition and fees (p. 150) page as credit costs differ depending on the college the course is located in.

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
<b>Methods, Statistics, and Applications Core</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
PPUA 6509 or PPUA 6506	Techniques of Program Evaluation Techniques of Policy Analysis	4
<b>Policy Frameworks and Practice Core</b>		
LPSC 7311	Strategizing Public Policy	4
PPUA 6502	Economic Analysis for Policy and Planning	4
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Methods and Statistics Elective</b>		
Complete 4 semester hours from the following:		4
INSH 7400	Quantitative Analysis	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	

### Internship Requirement

Code	Title	Hours
PPUA 6861	Internship	0

### Concentration or Electives Option

A concentration is not required. Students may complete electives (from the elective list below) in lieu of a concentration.

- Healthcare Management and Policy Concentration (p. 1085)
- Sustainability and Climate Change Policy Concentration (p. 1085)
- Electives (p. 1086)

## Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.	Co-op Work Experience and Experiential Integration	1-2
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	

## Program Credit/GPA Requirements

40 total semester hours required (41–42 with optional co-op)  
Minimum 3.000 GPA required

## HEALTHCARE MANAGEMENT AND POLICY CONCENTRATION

Code	Title	Hours
<b>Health Management</b>		
Complete one of the following:		3-4
HRMG 6220	Health Organization Management	
STRT 6220	Strategic Management for Healthcare Organizations	
<b>Health Policy</b>		
Complete one of the following:		3-4
PHTH 5212	Public Health Administration and Policy	
PHTH 5234	Economic Perspectives on Health Policy	
PPUA 5240	Health Policy and Politics	
<b>Electives</b>		
<i>Health Elective</i>		
Complete one of the following:		3
PHTH 5120	Race, Ethnicity, and Health in the United States	
PHTH 5212	Public Health Administration and Policy	
PHTH 5214	Environmental Health	
PHTH 5222	Health Advocacy	
PHTH 5230	Global Health	
PHTH 6200	Principles and History of Urban Health	
PHTH 6204	Society, Behavior, and Health	
<i>General Elective</i>		
Complete an additional course from the health elective list above or one of the following:		2-3
PPUA 6202	Research Toolkit for Python for Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	

## SUSTAINABILITY AND CLIMATE CHANGE POLICY CONCENTRATION

Code	Title	Hours
Complete 12 semester hours from the following:		12
ENVR 6150	Food Security and Sustainability	
LPSC 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	

**ELECTIVES OPTION**

Code	Title	Hours
Complete 12 semester hours from the following:		
LPSC 5000 to LPSC 7999		12
PPUA 5000 to PPUA 7999		
CRIM 5000 to CRIM 7999 (by advisement only)		
ECON 5000 to ECON 7999 (by advisement only)		
ENGL 5000 to ENGL 7999 (by advisement only)		
HIST 5000 to HIST 7999 (by advisement only)		
POLS 5000 to POLS 7999 (by advisement only)		
SOCL 5000 to SOCL 7999 (by advisement only)		

**Engineering and Public Policy, MS**

For program contact information, please visit the College of Engineering website (<https://cee.northeastern.edu/academics/graduate-studies/ms-cepp/>).

The purpose of this degree is to provide students with a background in engineering with the tools necessary to conduct robust policy analysis. It includes required core courses from the Department of Civil and Environmental Engineering and the School of Public Policy and Urban Affairs, complemented by electives in engineering and public policy, which can be met by two courses and a master's report (recommended), or by one course and a thesis, or by three courses. A minimum of 16 semester hours must be taken in the College of Engineering.

Degree Requirements	With Project	With Thesis	Coursework Only
Required core courses	20 SH	20 SH	20 SH
Other electives	8 SH	4 SH	12 SH
Master of Science report/thesis	4 SH	8 SH	
Minimum semester hours required	32 SH	32 SH	32 SH

**Graduate Certificate Options**

Students enrolled in a master's degree have the opportunity to also pursue one of the many engineering graduate certificate options in addition to or in combination with the MS degree. Students should consult their faculty advisor regarding these options (p. 625).

**GORDON INSTITUTE OF ENGINEERING LEADERSHIP****Master's Degree in Engineering and Public Policy with Graduate Certificate in Engineering Leadership**

Students may complete a Master of Science in Engineering and Public Policy in addition to earning a Graduate Certificate in Engineering Leadership (p. 609). Students must apply and be admitted to the Gordon Engineering Leadership Program in order to pursue this option. The program requires fulfillment of the 16 semester-hour curriculum required to earn the Graduate Certificate in Engineering Leadership, which includes an industry-based challenge project with multiple mentors. The integrated 36-semester-hour degree and certificate will require 20 hours of advisor-approved technical courses.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

**Sustainable Engineering and Systems Modeling Requirements**

Code	Title	Hours
Complete 12 semester hours from the following:		
CIVE 5261 or PPUA 5261	Dynamic Modeling for Environmental Investment and Policymaking Dynamic Modeling for Environmental Decision Making	12
CIVE 5275	Life Cycle Assessment of Materials, Products, and Infrastructure	
CIVE 5363	Climate Science, Engineering Adaptation, and Policy	

CIVE 5368	Air Quality Management
CIVE 6566	Sustainable Urban Transportation: Netherlands
CIVE 6777	Climate Hazards and Resilient Cities Abroad
CIVE 6778	Climate Adaptation and Policy Abroad
CIVE 7100	Time Series and Geospatial Data Sciences
CIVE 7110	Critical Infrastructure Resilience
CIVE 7150	Data-Driven Decision Support for Civil and Environmental Engineering
CIVE 7151	Urban Informatics and Processing
CIVE 7155	Dynamics and Control of Infrastructure Systems
EECE 5670	Sustainable Energy: Materials, Conversion, Storage, and Usage
IE 5500	Systems Engineering in Public Programs
IE 5640	Data Mining for Engineering Applications
IE 6200	Engineering Probability and Statistics
IE 7280	Statistical Methods in Engineering
ME 5645	Environmental Issues in Manufacturing and Product Use
SBSY 5100	Sustainable Design and Technologies in Construction
SBSY 5200	Sustainable Engineering Systems for Buildings
SBSY 5400	Sustainable Building Systems Seminar

## Public Policy and Analysis Requirements

Code	Title	Hours
Complete 8 semester hours from the following:		8
ECON 7266	Economics of Government	
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 6500	Statistical Analysis	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5260	Ecological Economics	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 6532	Building Resilience into Local Government	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

## Options

Complete one of the following options:

### COURSEWORK OPTION

Code	Title	Hours
Complete 12 semester hours from the Elective Course List below.		12

### PROJECT OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
Complete 8 semester hours from the Elective Course List below.		8

### THESIS OPTION

Code	Title	Hours
CIVE 7945	Master's Project	4
CIVE 7990	Thesis	4
Complete 4 semester hours from the Elective Course List below.		4

In addition to completing the thesis course, students must successfully complete the thesis submission process, including securing Committee and Graduate School of Engineering signatures and submission of an electronic copy of their MS Thesis to ProQuest.

## **Elective Course List**

Code	Title	Hours
CIVE 5150	Climate and Atmospheric Change	
CIVE 5250	Organic Pollutants in the Environment	
CIVE 5271	Solid and Hazardous Waste Management	
CIVE 5280	Remote Sensing of the Environment	
CIVE 5281	Coastal Dynamics and Design	
CIVE 5300 and CIVE 5301	Environmental Sampling and Analysis and Lab for CIVE 5300	
CIVE 5670	Global Biogeochemistry	
CIVE 7230	Legal Aspects of Civil Engineering	
CIVE 7392	Special Topics in Environmental Engineering (Equity in Civil and Environmental Engineering)	
EMGT 6225	Economic Decision Making	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 6102	Environmental Science and Policy Seminar 2	
INSH 7400	Quantitative Analysis	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	
PHTH 5230	Global Health	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5262	Big Data for Cities	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	
PPUA 7346	Resilient Cities	

## **Program Credit/GPA Requirements**

32 total semester hours required

Minimum 3.000 GPA required

## **Environmental Science and Policy, MS**

The Master of Science in Environmental Science and Policy program emphasizes a broadly interdisciplinary and synthetic approach that integrates knowledge in the environmental sciences (conservation biology, climate change, fisheries science, ecosystem function, biodiversity, restoration ecology) with the social sciences (policy, economics, sociology, political science, and development) and humanities (environmental history, philosophy, and ethics). The goal of the program is to equip professionals with substantive breadth in knowledge and skills at the intersection of environmental science and policy. The program focuses on training students to think critically about the underlying causes of environmental problems and understanding the reciprocal relationships between coupled human-natural ecosystems and the interconnections between social and technological innovations. The program explores practical approaches and potential solutions that decision makers need to evaluate in policy debates related to promoting environmental sustainability.

## **Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Seminars</b>		
PPUA 6101	Environmental Science and Policy Seminar 1	4
ENVR 6102	Environmental Science and Policy Seminar 2	4
<b>Skills Courses</b>		
Complete 2 courses from the following. At least one course needs to be taken from the College of Science Skills Course List		8
and one course from the College of Social Sciences and Humanities Skills Course List.		
<i>College of Science Skills Course List</i>		
EEMB 5130	Population Dynamics	
EEMB 5522	Experimental Design Marine Ecology	
ENVR 5150	Climate and Atmospheric Change	
ENVR 5210	Environmental Planning	
ENVR 5260	Geographical Information Systems	
ENVR 5450	Applied Social-Ecological Systems Modeling	
ENVR 6500	Biostatistics	
<i>College of Social Sciences and Humanities Skills Course List</i>		
INSH 5301	Introduction to Computational Statistics	
INSH 6300	Research Methods in the Social Sciences	
INSH 7400	Quantitative Analysis	
LPSC 7311	Strategizing Public Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 6505	Public Budgeting and Financial Management	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6525	Institutions and Public Policy	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

## Electives

Complete five courses from the following list. At least one course must be taken from the College of Science Elective Course List and one course from the College of Social Sciences and Humanities Elective Course List. Any skills course not taken to fulfill the skills courses requirement can be taken as an elective. Students may petition to enroll in other relevant graduate courses offered by other schools at Northeastern University.

### COLLEGE OF SCIENCE ELECTIVE LIST

Code	Title	Hours
EEMB 5130 - EEMB 8984		
ENVR 5115 - ENVR 6900		

### COLLEGE OF SOCIAL SCIENCES AND HUMANITIES ELECTIVE LIST

Code	Title	Hours
INSH 5302	Information Design and Visual Analytics	
INTL 5100	Climate and Development	
LPSC 7311	Strategizing Public Policy	
LPSC 7312	Cities, Sustainability, and Climate Change	
PHTH 5214	Environmental Health	

PHTH 5230	Global Health
PPUA 5100 - PPUA 7346	
SOCL 7267	Environment, Health, and Society

## Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

### Urban Informatics, MS

The Master of Science in Urban Informatics (MSUI) degree couples comprehensive data analytics skills with an understanding of the big questions faced by cities in the 21st-century city. This cutting-edge program is built upon a unique cross-college initiative, which offers comprehensive state-of-the-art training in the core skills of data analytics—including quantitative analysis, data mining, machine learning, and data visualization. Urban informatics students supplement training in these foundational skills with a specialized sequence of courses that address how data and technology are being used to tackle key social, infrastructural, and environmental challenges.

By combining a theoretically informed perspective of cities with advanced skills in accessing, managing, analyzing, and communicating insights from large complex, datasets, graduates are a part of the next wave of urban professionals ready to lead in the public, private, and nonprofit sectors. Given the continuous growth in urban data and technology, these professionals are essential to shaping the future of urban areas around the globe.

This program provides a uniquely integrated urban and informatics degree with a substantial experiential education component. The focus throughout is on practical application, and students have multiple opportunities to apply what they are learning.

The master's program offers an optional cooperative education experience (co-op) to eligible students. Co-op education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

Please review the tuition and fee (p. 144) page as credit costs differ depending on the college in which the course resides.

### Climate and Resilience Concentration

This graduate concentration is available to students in the MSUI who want to specialize in the policy challenges that arise from climate change and the methodological tools designed to respond to them, especially those that help us understand and instill resilience in communities that are vulnerable to disruption. The concentration is comprised of three courses: a methods and applications course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to climate and resilience.

### Communities and Economic Development Concentration

This graduate concentration is available to students in the MSUI who want to specialize in the policy challenges associated with neighborhoods and communities and the methodological tools for addressing them. This includes examining more closely how communities work and the types of interventions that can help them to thrive and prosper. The concentration is comprised of three courses: a methods and applications course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to communities and economic development.

### Transportation and Infrastructure Concentration

This graduate concentration is available to students in the MSUI who want to specialize in the policy challenges and methods associated with transportation and related infrastructure. This includes questions of policy and operations pertaining to traffic management and public transit and the skills for analyzing mobility decisions. The concentration is comprised of three courses: a methods and applications course specific to the concentration; an analysis course specific to the concentration; and the requirement to complete a capstone or practicum relevant to transportation or infrastructure.

CSSH Graduate Programs General Regulations (p. 1031)

### Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Data Science Courses</b>		
DA 5020 or DA 5030 or PPUA 7237	Collecting, Storing, and Retrieving Data Introduction to Data Mining/Machine Learning Advanced Spatial Analysis of Urban Systems	4
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4
<b>Methods and Applications</b>		
PPUA 5262	Big Data for Cities	4

## Concentrations or Electives Option

A concentration is not required. Students may complete electives option in lieu of a concentration.

- Climate and Resilience (p. 1091)
- Communities and Economic Development (p. 1092)
- Transportation and Infrastructure (p. 1092)
- Electives (p. 1093)

## OPTIONAL CO-OP EXPERIENCE

Code	Title	Hours
Four-month co-ops require registration at 1 SH for one term. Longer co-ops require registration at 1 SH per term for two consecutive terms:		
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	1-2

## Program Credit/GPA Requirements

33 total semester hours required (34-35 with optional co-op)

Minimum 3.000 GPA required

## CLIMATE AND RESILIENCE CONCENTRATION

Code	Title	Hours
<b>Methods and Applications</b>		
Complete 4 semester hours from the following:		
PPUA 5246	Participatory Modeling for Collaborative Decision Making	4
PPUA 5260	Ecological Economics	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
PPUA 7346	Resilient Cities	
<b>Analysis</b>		
Complete 4 semester hours from the following:		
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	4
INSH 6302	Qualitative Methods	
POLS 7334	Social Networks	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
CIVE 7000-level Special Topics in Engineering—approved by program director		

**Practicum or Capstone**

Complete topic-focused capstone or practicum approved by program director.

4

PPUA 6966 or PPUA 7673	Practicum Capstone in Public Policy and Urban Affairs
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**Portfolio**

PPUA 6410	Urban Informatics Portfolio
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**COMMUNITIES AND ECONOMIC DEVELOPMENT CONCENTRATION**

Code	Title	Hours
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**Methods and Applications**

Complete 4 semester hours from the following:

4

CRIM 6270	Crime and Community Context
IE 7374	Special Topics in Industrial Engineering (Sharing Economy Systems)
PPUA 5230	Housing Policy
PPUA 5235	Participatory Community Planning Methods
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 5265	Global Urbanization and Planning
PPUA 6502	Economic Analysis for Policy and Planning
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs

**Analysis**

Complete 4 semester hours from the following:

4

INSH 6101	Agent-Based Modeling for Applied and Social Sciences
INSH 6302	Qualitative Methods
INSH 6406	Analyzing Complex Digitized Data
POLS 7334	Social Networks
PPUA 6509	Techniques of Program Evaluation

**Practicum or Capstone**

Complete topic-focused capstone or practicum approved by program director.

4

PPUA 6966 or PPUA 7673	Practicum Capstone in Public Policy and Urban Affairs
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**Portfolio**

PPUA 6410	Urban Informatics Portfolio
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**TRANSPORTATION AND INFRASTRUCTURE CONCENTRATION**

Code	Title	Hours
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**Methods and Applications**

Complete one of the following:

4

IE 7374	Special Topics in Industrial Engineering (Sharing Economy Systems)
PPUA 5246	Participatory Modeling for Collaborative Decision Making
PPUA 7346	Resilient Cities

**Analysis**

Complete 4 semester hours from the following:

4

CIVE 7110	Critical Infrastructure Resilience
CIVE 7380	Performance Models and Simulation of Transportation Networks
CIVE 7381	Transportation Demand Forecasting and Model Estimation
INSH 6101	Agent-Based Modeling for Applied and Social Sciences
NETS 7350	Bayesian and Network Statistics

CIVE 7000-level Special Topics in Engineering—approved by program director

**Practicum or Capstone**

Complete topic-focused capstone or practicum approved by program director.

4

PPUA 6966 or PPUA 7673	Practicum Capstone in Public Policy and Urban Affairs
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**Portfolio**

PPUA 6410	Urban Informatics Portfolio
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1

**ELECTIVES OPTION**

Code	Title	Hours
<b>Methods and Applications</b>		
PPUA 5266	Urban Theory and Science	4
<b>Analysis</b>		
Complete 4 semester hours from the following:		4
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
INSH 6406	Analyzing Complex Digitized Data	
POLS 7334	Social Networks	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 6202	Research Toolkit for Python for Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
<b>Practicum or Capstone</b>		
PPUA 6966 or PPUA 7673	Practicum Capstone in Public Policy and Urban Affairs	4
<b>Portfolio</b>		
PPUA 6410	Urban Informatics Portfolio	1

**Urban Planning and Policy, MS**

The Master of Science in Urban Planning and Policy program trains leaders interested in building just and sustainable solutions to today's critical urban problems. Students in the program develop the theoretical and analytical tools to understand contemporary challenges of social, racial, and environmental injustice in cities and urban regions. They develop professional tools to work effectively in the realms of planning, policy, politics, and advocacy to impact urban challenges, including affordable housing provision, equitable and sustainable economic growth, sustainable transportation, and climate change adaptation and mitigation. This innovative program combines the expertise in urban planning and policy analysis data analytics of the School of Public Policy and Urban Affairs with expertise in physical planning, design, and data visualization at the School of Architecture. The core curriculum of the program provides students with a solid foundation in essential skills and concepts, including techniques of effective community engagement, research design and statistics, economic analysis, legal foundations of urban planning and policy, and the history of urban development and urban planning. Students also have the opportunity to develop substantial expertise in a specialization area, including urban analytics, urban sustainability and resilience, urban design and physical planning, and urban development policy and planning.

The optional cooperative education experience (co-op) is available to eligible students. Cooperative education is central to both the Northeastern experience and to the College of Social Sciences and Humanities experiential liberal arts framework. Northeastern's signature co-op ecosystem provides qualified master's students with six-month work experiences in businesses, nonprofits, and government agencies in Boston and across the United States. Graduate students take their work from campus learning spaces, apply their knowledge outside of the classroom, and then bring knowledge and skills gained in community learning spaces back to our campus learning spaces during the cocurricular experiential integration course.

In addition to the co-op option, students in the program have opportunities to gain experience in the application of their knowledge and skills via internships, class projects, and a capstone research report. They graduate prepared for careers working for state and local government, federal agencies, community development corporations and other nonprofit organizations, research institutes, and as private-sector planning consultants.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Planning and Policy</b>		
PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4

PPUA 6502	Economic Analysis for Policy and Planning	4
SUEN 6340	Topics in Urban Environmental Design	4
<b>Research Design</b>		
INSH 6300	Research Methods in the Social Sciences	4
<b>Quantitative Techniques</b>		
Students in the urban analytics focus area are encouraged to take INSH 5301.		
Choose one from the following:		
INSH 5301	Introduction to Computational Statistics	
INSH 6500	Statistical Analysis	
<b>Planning Law</b>		
Choose one from the following:		
LPSG 5201	Law and the City	
PPUA 5201	Urban Planning and the Law	
<b>Planning and Social Justice</b>		
Choose one from the following:		
PPUA 5233	Contemporary Community Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 6219	Race, Justice, and Belonging in Planning Practice	

## Focus Areas

Complete one of the following focus areas:

- Urban Design and Physical Planning (p. 253)
- Urban Analytics (p. 253)
- Sustainability and Resilience (p. 253)
- Urban Development Policy and Planning (p. 254)

## URBAN DESIGN AND PHYSICAL PLANNING

Code	Title	Hours
<b>Gateway Course</b>		
ARCH 6340	Graduate Topics in Architecture	4
<b>Tracks</b>		
Complete one of the following tracks:		
<i>Urban Design and Real Estate</i>		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
<i>Physical Planning and Design for Sustainable Urbanism</i>		
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
<i>Urban Experience Track</i>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	
ARTG 6310	Design for Behavior and Experience	
<b>Capstone</b>		
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	6

## URBAN ANALYTICS

Code	Title	Hours
<b>Gateway Course</b>		
PPUA 5262	Big Data for Cities	4
<b>Required Courses</b>		
ARTG 5150 and ARTG 5151	Information Visualization Principles and Practices and Information Design Critique Seminar	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4

<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>SUSTAINABILITY AND RESILIENCE</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Gateway Course</b>		
LPSC 7312 or SUEN 6310	Cities, Sustainability, and Climate Change Cities, Nature, and Design in Contemporary History and Theory	4
<b>Methods</b>		
Complete one of the following:		4
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
SUEN 7230	Urban Ecologies and Technologies 1	
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Elective</b>		
Complete one of the following:		4
PPUA 5231	Transportation Policy	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	
SUEN 7240	Urban Ecologies and Technologies 2	
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments	
<b>URBAN DEVELOPMENT POLICY AND PLANNING</b>		
<b>Code</b>	<b>Title</b>	<b>Hours</b>
<b>Gateway Course</b>		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5233	Contemporary Community Development	
PPUA 5265	Global Urbanization and Planning	
<b>Methods</b>		
PPUA 5263 or PPUA 5236	Geographic Information Systems for Urban and Regional Policy Introduction to Real Estate Development for Urban Policy Makers	4
<b>Capstone</b>		
PPUA 7673	Capstone in Public Policy and Urban Affairs	4
<b>Elective</b>		
Complete one of the following:		4
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5265	Global Urbanization and Planning	

PPUA 5270	Food Systems and Public Policy
PPUA 6506	Techniques of Policy Analysis
PPUA 6551	Nonprofit Organizations and Social Change
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems
SUEN 6340	Topics in Urban Environmental Design

**Electives**

Code	Title	Hours
Complete 4-8 semester hours of the following:		
ARCH 5310	Design Tactics and Operations	
ARCH 5530	Innovative Models in Real Estate Development and Design	
ARCH 6100	Graduate Skills Studio	
ARCH 6330	Seminar in Modern Architecture	
ARCH 6340	Graduate Topics in Architecture	
ARTG 5100	Information Design Studio 1: Principles	
ARTG 5120	Research Methods for Design	
ARTG 5130	Visual Communication for Information Design	
ARTG 5330	Visualization Technologies 1: Fundamentals	
ARTG 6330	Information Design Mapping Strategies	
DA 5020	Collecting, Storing, and Retrieving Data	
DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5302	Information Design and Visual Analytics	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5232	Immigration and Urban America	
PPUA 5233	Contemporary Community Development	
PPUA 5234	Land Use and Urban Growth Policy	
PPUA 5236	Introduction to Real Estate Development for Urban Policy Makers	
PPUA 5238	Climate Change and Global Urbanization	
PPUA 5239	Problems in Metropolitan Policymaking	
PPUA 5244	Comparative Public Policy and Administration	
PPUA 5245	Education Policy in the United States	
PPUA 5249	Sustainable Urban Coastal Policy	
PPUA 5260	Ecological Economics	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5265	Global Urbanization and Planning	
PPUA 5270	Food Systems and Public Policy	
PPUA 6202	Research Toolkit for Python for Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6506	Techniques of Policy Analysis	
PPUA 6551	Nonprofit Organizations and Social Change	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	
SUEN 6110	Graduate Studio 1: Sustainable Urban Sites	
SUEN 6120	Graduate Studio 2: Sustainable Urban Systems	
SUEN 6210	Implementation and Visualization for Urban Environments 1	
SUEN 6220	Implementation and Visualization for Urban Environments 2	
SUEN 6310	Cities, Nature, and Design in Contemporary History and Theory	
SUEN 6340	Topics in Urban Environmental Design	
SUEN 7230	Urban Ecologies and Technologies 1	

SUEN 7240	Urban Ecologies and Technologies 2
SUEN 7320	Pro-Seminar: Issues in Designed Urban Environments

## Optional Co-op Experience

Code	Title	Hours
Requires two consecutive semesters of Co-op Work Experience and Experiential Integration:		
PPUA 6964 and INSH 6864	Co-op Work Experience and Experiential Integration	2

## Program Credit/GPA Requirements

48 total semester hours required (50 with optional co-op)

Minimum 3.000 GPA required

## Law, JD / Public Policy, MPP

The JD/Master of Public Policy (MPP) is designed to equip graduates with a unique blend of skills for navigating a complex and rapidly changing policy landscape. The program builds on students' legal training with a compelling blend of skills in applied public policy analysis, policy design, and strategic policy formation. Students also gain career-relevant experience through internships, small group capstone projects, and other interactions with professionals in the field. All are part of a learning process designed to enable the Northeastern law and public policy graduates to navigate, and to redefine, diverse policy areas.

Ideally, students would apply to Northeastern's JD and MPP programs simultaneously. Those who apply and are admitted to both programs take MPP classes after completing their first year in the School of Law. Applicants may also be considered after they have enrolled in the JD program; interested JD students should consult the School of Law's Office of Academic and Student Affairs and the School of Public Policy and Urban Affairs graduate program director for more information.

Students enrolled in this dual-degree program will be able to count 8 JD credit hours toward their MPP degree and 12 MPP credit hours toward their JD degree. Students should consult advisors in each program if they have questions about which courses may be shared between degrees.

All JD students, including FlexJD students, are ordinarily eligible to apply into dual degree pathways.

## Nonprofit Sector, Philanthropy, and Social Change, Graduate Certificate

School of Public Policy and Urban Affairs (<https://cssh.northeastern.edu/policyschool/>)

CSSH Graduate Programs General Regulations (p. 1031)

The Graduate Certificate in Nonprofit Sector, Philanthropy, and Social Change is a response to recent developments in social change theory, practice, and funding that are placing new demands and expectations on social change actors in the nonprofit, public, and private sectors, including nonprofit leaders, philanthropists, policymakers, and corporate social responsibility managers. These developments include the emergence of hybrid, cross-sector business models and new intermediary mechanisms for channeling the flow of capital into social change; new expectations and standards for performance measurement, transparency, and accountability; more sophisticated use of data and technology to support decision making, evaluation, and continual improvement; decreased public funding for traditional nonprofit activities; and the emergence of social media as a vehicle for mobilizing people and resources. The certificate enables social change professionals in all sectors to respond to these changes more effectively and will distinguish itself from other nonprofit certificate programs by focusing on the relationship between social program implementation and funding.

The certificate is a professionally oriented, application-based program for students seeking leadership positions in nonprofit organizations or in a public agency that deals extensively with nonprofits. The curriculum is designed to address the distinctive features and practices of the nonprofit sector and emphasizes management techniques helpful to nonprofit leaders.

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose GPA falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
PPUA 6551	Nonprofit Organizations and Social Change	4
PPUA 6552	The Nonprofit Sector in Civil Society and Public Affairs	4

## Elective

Code	Title	Hours
Complete 4 semester hours from the following. Courses outside this list may be taken as electives with approval of the graduate program director.		
PPUA 6202	Research Toolkit for Python for Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 6503	Managing People in Public and Nonprofit Sectors	
PPUA 6509	Techniques of Program Evaluation	
PPUA 6522	Administrative Ethics and Public Management	

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Public Policy Analysis, Graduate Certificate

CSSH Graduate General Regulations (p. 1031)

The Graduate Certificate in Public Policy Analysis seeks to provide students with the tools to analyze and shape public policy at the local, state, and national levels. Students have an opportunity to gain an understanding of the political and legal processes of policymaking, develop skills central to conducting research on policy questions, and learn techniques for evaluating the effectiveness of competing policies.

## Academic Standing/Progress

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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## Core Requirements

Students may not reuse required degree courses for the certificate.

Code	Title	Hours
<b>Analysis Methods and Skills</b>		
Complete 8 semester hours from the following:		
INSH 5302	Information Design and Visual Analytics	
INSH 6300	Research Methods in the Social Sciences	
LPSC 7311 or PPUA 6506	Strategizing Public Policy Techniques of Policy Analysis	
PPUA 6502	Economic Analysis for Policy and Planning	
PPUA 5260	Ecological Economics	

PPUA 5261	Dynamic Modeling for Environmental Decision Making
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6509	Techniques of Program Evaluation
PPUA 7237	Advanced Spatial Analysis of Urban Systems

**Policy**

Complete 4 semester hours from the following:

4

PPUA 5230	Housing Policy
PPUA 5231	Transportation Policy
PPUA 5232	Immigration and Urban America
PPUA 5234	Land Use and Urban Growth Policy
PPUA 5240	Health Policy and Politics
PPUA 5245	Education Policy in the United States
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change
PPUA 5270	Food Systems and Public Policy
PPUA 6525	Institutions and Public Policy

## Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

**Sustainability and Climate Change Policy, Graduate Certificate**

This graduate certificate, a collaboration between the School of Public Policy (SPPUA) and the School of Law (NUSL), is designed to prepare students for the dynamic, evolving landscape of climate and sustainability policy. Interest in the area of climate and sustainability policy is expanding rapidly among graduate students in multiple programs throughout Northeastern and among professionals who may be considering graduate coursework at Northeastern. This certificate provides students from multiple backgrounds an option for gaining interdisciplinary skills and perspectives in climate and sustainability policy. Given the growing need in every organization, including private sector, public sector, and nonprofits, for professionals with knowledge and training in how to respond to the rapidly changing policy and regulatory frameworks in climate and sustainability, this certificate is open to JD, master's and PhD students throughout the university. This certificate is also available to professionals who have not yet been admitted to one of Northeastern's graduate programs.

**Academic Standing/Progress**

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
<b>Policy</b>		
Complete 8 semester hours from the following:		8
ENVR 5350	Sustainable Energy and Climate Solutions	
LPSL 7312	Cities, Sustainability, and Climate Change	
PPUA 5100	Climate and Development	
PPUA 5264	Energy Democracy and Climate Justice: Technology, Policy, and Social Change	
PPUA 5268	International Environmental Policy	

PPUA 5270	Food Systems and Public Policy	
PPUA 6101	Environmental Science and Policy Seminar 1	
<b>Law</b>		
Complete 3 semester hours from the following:	1	3
LAW 7329	Environmental Law	
or LW 7329	Environmental Law	
LAW 7634	Energy Law and Policy	
or LW 7634	Energy Law and Policy	
LAW 7666	Human Rights, the Environment, Development and Community Resilience	
or LW 7666	Human Rights, the Environment, Development and Community Resilience	

**Practicum**

PPUA 6966	Practicum	1
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- <sup>1</sup> Students enrolled in NU colleges other than the School of Law should contact a School of Law advisor at lawstudentaffairs@northeastern.edu for guidance on registering for courses from the School of Law.

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

**Urban Analytics, Graduate Certificate****CSSH Graduate General Regulations (p. 1031)**

With 75 percent of the world's population projected to be living in cities by 2050, the need for professionals in urban planning and related careers will only increase. The Graduate Certificate in Urban Analytics seeks to prepare students outside of the Master of Science in Urban Informatics program to manage the progressively complex issues involved with rapidly expanding data and technological resources in cities. As Claire Lane of the City of Boston recently noted, "The blueprints for great cities are increasingly anchored in big data, expressed in GIS [Geographic Information Systems] and codified in coherent policy." Successful graduates with an urban analytics certificate have skills in each of these areas, which prepares them to be professionals ready to shape the future of cities across the globe.

Students are trained with the practical and theoretical knowledge necessary to understand the intricacies of interconnected urban systems and to analyze how these systems work together to create sustainable, resilient, and just cities. The curriculum emphasizes the expertise needed to bridge emerging technological capacities and traditional policymaking processes. Students cultivate applied skills in visual presentation, analysis, and modeling of new data sets—all of which helps to inform investment and policymaking. Inspired by Northeastern's leadership in experiential education, students use Boston and cities around the world as learning labs.

**Academic Standing/Progress**

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

**Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
PPUA 5262	Big Data for Cities	4
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	4

**Elective**

Code	Title	Hours
Complete 4 semester hours from the following or another elective in consultation with your faculty advisor.		4
INSH 6101	Agent-Based Modeling for Applied and Social Sciences	
PPUA 5246	Participatory Modeling for Collaborative Decision Making	
PPUA 5261	Dynamic Modeling for Environmental Decision Making	
PPUA 5266	Urban Theory and Science	
PPUA 6202	Research Toolkit for Python for Policy	
PPUA 6212	Research Toolkit for Urban and Regional Policy: Project Management	
PPUA 6216	Research Toolkit for Urban and Regional Policy: Grant Writing	
PPUA 7237	Advanced Spatial Analysis of Urban Systems	

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

**Urban Studies, Graduate Certificate**

CSSH Graduate Programs General Regulations (p. 1031)

The Graduate Certificate in Urban Studies provides a foundation in the fundamentals of urban planning and policy theory for students outside the Master of Science in Urban Planning and Policy degree. It also allows students to pursue course work in a range of areas of concentration, including housing and community development, urban environmental sustainability, economic development, international comparative urban policy, and transportation.

**Academic Standing/Progress**

Students in the program are monitored for academic progress. Those students whose grade-point average (GPA) falls below a 3.000 are notified by and meet with the director of academic programs. They are counseled that if their GPA does not rise to a 3.000 or higher, they run the risk of not graduating and are advised on strategies for improvement.

**Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirement**

Code	Title	Hours
Complete 4 semester hour course:		

PPUA 6201	The 21st-Century City: Urban Opportunities and Challenges in a Global Context	4
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Code	Title	Hours
Complete 4 semester hours from the following:		4
LPSA 7312	Cities, Sustainability, and Climate Change	
PPUA 5230	Housing Policy	
PPUA 5231	Transportation Policy	
PPUA 5233	Contemporary Community Development	
PPUA 5235	Participatory Community Planning Methods	
PPUA 5262	Big Data for Cities	
PPUA 5265	Global Urbanization and Planning	
SUEN 6340	Topics in Urban Environmental Design	

**Elective**

Code	Title	Hours
PPUA 5000 to PPUA 7999	Complete 4 semester hours in the following range (selected by advisement):	4

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

**Sociology**Website (<http://www.northeastern.edu/cssh/socant/>)**Alisa Lincoln, PhD**

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 a.lincoln@northeastern.edu (l.weinstein@northeastern.edu)

**Tiffany Joseph, PhD**

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## CSSH Graduate Programs General Regulations (p. 1031)

The Department of Sociology and Anthropology at Northeastern University is home to a distinguished graduate program offering a Doctor of Philosophy in Sociology. The primary objectives of our graduate program are to offer a strong curricular foundation in sociology and the social sciences; to inculcate in students a depth of knowledge in the basic tools of the discipline; to train our students to be outstanding teachers and researchers; and to provide professional socialization that adequately prepares students for a career in the discipline.

The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale. We boast strengths in 11 different research foci (<https://cssh.northeastern.edu/socant/research-foci/>):

- Gender, sexuality, and intersectionality
- Political change and social movements
- Work, labor, and economic insecurity
- Global economy and culture
- Violence, conflict, and security
- Cities and urbanization
- Health and health equity
- Environment and environmental justice
- Racial identity, racism, and anti-racism
- Migration and immigrant communities
- Science and technology studies

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers, including the Social Science Environmental Health Research Institute (<http://www.northeastern.edu/environmentalhealth/>); the Brudnick Center on Violence and Conflict (<https://cssh.northeastern.edu/brudnickcenter/>); the Dukakis Center for Urban and Regional Policy (<https://cssh.northeastern.edu/dukakiscenter/>); and the Institute for Health Equity and Social Justice Research (<https://bouve.northeastern.edu/institute-for-health-equity-and-social-justice-research/>). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus, including environmental studies; law and public policy; Latino, Latin American, and Caribbean studies; African American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate director or their advisors in contacting individual faculty members.

## Programs

### Doctor of Philosophy

- Sociology (p. 1104)

### Sociology, MA

This degree is only awarded to students who enter the doctoral degree program in sociology without an advanced degree in sociology. Students may qualify to receive an MA degree upon completing the program requirements listed here. Please see the PhD in Sociology (p. 1104) for more information about this program. No students will be admitted directly into this program to pursue a master's degree.

## Program Requirements

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
- 

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review

## Tracks

Complete one of the following tracks:

### ACADEMIC TRACK

Code	Title	Hours
<b>Foundations</b>		
A grade of B or higher is required in each foundations course:		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
<b>Research Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
<b>Statistical Methods</b>		
INSH 6500	Statistical Analysis	4
<b>Electives</b>		
Complete 14 semester hours from the following:		14
SOCL 5000–7990		

### APPLIED TRACK

Code	Title	Hours
<b>Foundations</b>		
A grade of B or higher is required:		
SOCL 7200	Foundations of Social Theory 1	4
<b>Research Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
<b>Statistical Methods</b>		
INSH 6500	Statistical Analysis	4
<b>Advanced Methods</b>		
Complete one of the following:		4
INSH 5301	Introduction to Computational Statistics	
INSH 5302	Information Design and Visual Analytics	
INSH 5303	Machine Learning in the Social Sciences	
INSH 5304	Social Network Analysis	
INSH 5500	Basic Principles of Statistical Analysis in the Social Sciences	

INSH 5501	The R Statistical Computing Platform
INSH 5502	Introduction to Probability and Statistics
INSH 5503	Multivariate Regression
INSH 5505	From Data to Information: Making Sense of "Found" Data
INSH 5506	From Information to Measurement: Using "Found" Data to Describe Objects, People, and Places
INSH 5509	Spatio-Temporal Data Representations
INSH 5510	Visualizing Relational Data
INSH 5602	Documenting Fieldwork Narratives: Oral History, Ethnography, Archival Practices
INSH 6101	Agent-Based Modeling for Applied and Social Sciences
INSH 6302	Qualitative Methods
INSH 6406	Analyzing Complex Digitized Data
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities
INSH 7400	Quantitative Analysis
INSH 7500	Advanced Quantitative Analysis
INSH 7600	Multilevel Theorizing and Analysis
PHTH 6320	Qualitative Methods in Health and Illness
PPUA 5262	Big Data for Cities
PPUA 5263	Geographic Information Systems for Urban and Regional Policy
PPUA 6509	Techniques of Program Evaluation
<b>Electives</b>	
Complete 14 semester hours from the following:	
SOCL 5000–7990	

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## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.00 GPA required

## Sociology, PhD

The Department of Sociology and Anthropology at Northeastern University is home to a distinguished graduate program offering a PhD in Sociology. The primary objectives of our graduate program are to offer a strong curricular foundation in sociology and the social sciences; to inculcate in students a depth of knowledge in the basic tools of the discipline; to train our students to be outstanding teachers and researchers; and to provide professional socialization that adequately prepares students for a career in the discipline.

The PhD program is designed to attract students who wish to develop a broad base of sociological knowledge, such as would equip students to embark on academic careers in leading institutions of higher education. The PhD program boasts a wide array of curricular strengths and diverse methodological offerings, all of which draw upon the department's emphasis on the study of social inequalities along lines of race, class, and gender. Faculty expertise ranges widely from domestic U.S. concerns to issues that affect groups, regions, and societies on a global scale.

The PhD program is designed to admit relatively small numbers of graduate students each year, which affords students the opportunity to forge close working relationships with the faculty. Our faculty and graduate students work together in a number of interdisciplinary research projects, programs, and centers, including the Social Science Environmental Health Research Institute (<http://www.northeastern.edu/environmentalhealth/>); the Brudnick Center on Violence and Conflict (<http://www.northeastern.edu/brudnickcenter/>); the Dukakis Center for Urban and Regional Policy (<http://www.northeastern.edu/dukakiscenter/>); and the Institute for Health Equity and Social Justice Research (<https://bouve.northeastern.edu/institute-for-health-equity-and-social-justice-research/>). Many of the faculty in the Department of Sociology and Anthropology have additional interests and are affiliated with other departments on campus, including environmental studies; law and public policy; Latino, Latin American, and Caribbean studies; African American studies; international affairs; Jewish studies; and criminal justice. Students who wish to work with faculty in other disciplines are encouraged to enlist the aid of the sociology graduate director or their advisors in contacting individual faculty members.

## Admissions

Students interested in the PhD apply directly to that program. Students admitted without a master's degree earn the Master of Arts in Sociology en route once PhD coursework is completed. Please note that all applicants for the doctoral program are required to submit a writing sample that should consist of written materials that demonstrate their capacity for scholarship at the doctoral level. (Copies of several course or term papers or a copy of a master's thesis or paper are appropriate.)

## Coursework

Doctoral students are required to complete 60 standard credit hours (SH) with grades of B or higher if coming in with a bachelor's degree and 40 credit hours if coming in with a master's degree in sociology. Students admitted without a master's degree earn the MA in sociology en route to completing their PhD requirements (30 credits).

Required courses cover the core areas of sociological theory, research methods, and statistical analysis. All students must take courses in these areas regardless of their areas of specialization. Students must fulfill these requirements during their first year in the program. Students entering our program may be able to substitute courses taken at the prior institution for some or all of these requirements by submitting a course waiver form (a course waiver does not waive the associated semester hour requirement) or transfer of credit (courses submitted with a transfer of credit cannot have counted toward another degree).

## FOUR PROSEMINARS

Proseminars provide students structure for their first two years in the PhD program to help ensure their professionalization into the discipline and to help them move more smoothly through program requirements.

Each course meets weekly for 60-minute sessions throughout each fall and spring semester for the student's first two years. Each 1-credit course will be taken on a pass/fail basis. In order to receive a passing grade, students must attend most proseminal class meetings, complete the requirements for the proseminal course in a satisfactory manner, and attend most intellectual and professional development events organized by the department. Proseminar 1 and 2 are completed in the first year; Proseminar 3 and 4 are completed in the second year.

## POST COURSEWORK BUT PRIOR TO PROPOSAL DEFENSE

Students must complete two field statements prior to their proposal defense and will register for Exam Preparation—Doctoral (SOCL 8960) (with the field statement chair listed as instructor of record).

Once field statements are complete and students are working on their dissertation proposal, students should register for a Research course (with their committee chair listed as instructor of record) until the proposal is successfully defended.

## DEGREE CANDIDACY

To enter into degree candidacy, the student must have earned a Master of Arts degree or its departmental semester-hour equivalent, completed the four proseminalars, successfully defended two field statements, and defended their dissertation proposal.

*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MA in Sociology (p. 1103) degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MA in Sociology (p. 1103) degree. Note that no students will be admitted directly into the MA in Sociology (p. 1103) to pursue a master's degree.*

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Bachelor's Degree Entrance

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Two field statements  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Foundations</b>		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4

<b>Proseminars</b>		
SOCL 7001	Proseminar 1: Acclimating to Graduate School	1
SOCL 7002	Proseminar 2: Academic Planning	1
SOCL 7003	Proseminar 3: Committee, Topics, and Reading Lists	1
SOCL 7004	Proseminar 4: Field Statement Writing	1
<b>Research Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
<b>Advanced Methods</b>		
Complete 8 semester hours from the following. Courses not listed need approval from student's advisor.		8
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
INSH 7600	Multilevel Theorizing and Analysis	
PHTH 6320	Qualitative Methods in Health and Illness	
PPUA 6509	Techniques of Program Evaluation	

**Electives**

Code	Title	Hours
Complete 32 semester hours in the following ranges. Courses in additional disciplines may be allowed with prior advisor approval:		
CRIM 6000 to CRIM 7999		
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		
WMNS 6000 to WMNS 7999		

**Dissertation**

Code	Title	Hours
<b>Exam Preparation</b>		
SOCL 8960	Exam Preparation—Doctoral	
<b>Research</b>		
SOCL 8986	Research	
<b>Dissertation</b>		
SOCL 9990	Dissertation Term 1	
SOCL 9991	Dissertation Term 2	
<b>Dissertation Continuation</b>		
SOCL 9996	Dissertation Continuation	

**Progression Requirements**

Students who receive two grades below B may be placed on academic probation and risk being separated from the program.

**Program Credit/GPA Requirements**

60 total semester hours required

Minimum 3.500 GPA required

**Advanced Entry Program Requirements**

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Two field statements  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
<b>Foundations</b>		
SOCL 7200	Foundations of Social Theory 1	4
SOCL 7201	Foundations of Social Theory 2	4
<b>Proseminars</b>		
SOCL 7001	Proseminar 1: Acclimating to Graduate School	1
SOCL 7002	Proseminar 2: Academic Planning	1
SOCL 7003	Proseminar 3: Committee, Topics, and Reading Lists	1
SOCL 7004	Proseminar 4: Field Statement Writing	1
<b>Research Methods</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4
<b>Advanced Methods</b>		
Complete 8 semester hours from the following. Courses not listed need approval from student's advisor.		
INSH 6302	Qualitative Methods	
INSH 6406	Analyzing Complex Digitized Data	
INSH 7300	Advanced Research Methods in the Social Sciences and Humanities	
INSH 7400	Quantitative Analysis	
INSH 7500	Advanced Quantitative Analysis	
INSH 7600	Multilevel Theorizing and Analysis	
PHTH 6320	Qualitative Methods in Health and Illness	please note this course is only 3 credits
PPUA 6509	Techniques of Program Evaluation	

## Electives

Code	Title	Hours
Complete 12 semester hours in the following ranges. Courses in additional disciplines need student's advisor approval:		
CRIM 6000 to CRIM 7999		12
INSH 6000 to INSH 7999		
POLS 6000 to POLS 7999		
PPUA 6000 to PPUA 7999		
SOCL 6000 to SOCL 7999		
WMNS 6000 to WMNS 7999		

## Dissertation

Code	Title	Hours
<b>Exam Preparation</b>		
SOCL 8960	Exam Preparation—Doctoral	
<b>Research</b>		

SOCL 8986	Research
<b>Dissertation</b>	
SOCL 9990	Dissertation Term 1
SOCL 9991	Dissertation Term 2
<b>Dissertation Continuation</b>	
SOCL 9996	Dissertation Continuation

## Progression Requirements

Students who receive two grades below B may be placed on academic probation and risk being separated from the program.

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.500 GPA required

## Interdisciplinary Programs

### Doctor of Philosophy (PhD)

- Network Science (p. 344)

### Master of Science (MS)

- Applied Quantitative Methods and Social Analysis
- Complex Network Analysis

### Graduate Certificate

- Computational Social Science (p. 1116)
- Data Analytics (p. 372)
- Information Ethics (p. 1117)
- Women's, Gender, and Sexuality Studies (p. 1118)

## Network Science, PhD

The PhD program in network science aims to enhance our understanding of networks arising from the interplay of human behavior, sociotechnical infrastructures, information diffusion, and biological agents. This is an intrinsically multidisciplinary activity, with members of the network science community representing various fields including computer science, information science, complexity, physics, sociology, communication, organizational behavior, political science, and epidemiology. This doctoral program trains students in network science across several colleges—the College of Social Sciences and Humanities, the College of Science, the Khoury College of Computer Sciences, and the Bouvé College of Health Sciences. See other collaborating colleges' catalog sections for possible elective courses.

Coursework depends on a student's area of research and is subject to prior approval by their faculty advisor. Required coursework includes 20 semester hours of core courses in network science, plus an additional 20 semester hours of courses relevant to the students' area of research. A minimum of 40 semester hours of coursework is required, though the graduate program committee may recommend additional coursework based on student research interests.

## Annual Review

A review of satisfactory progress will be ongoing and formally evaluated at the end of the program's first and second years. Students must maintain a cumulative grade-point average of 3.000 or better in all coursework. Students are not allowed to retake courses. A student who does not maintain a 3.000 GPA, or is not making satisfactory progress on their dissertation research, may be recommended for dismissal by the graduate program committee.

Each student will have a primary dissertation advisor from the network science doctoral program faculty. The dissertation advisor should be selected by the end of the program's second year's spring semester.

The dissertation committee consists of at least four members: the dissertation advisor, one additional network science doctoral program faculty member, one member expert in the specific topic of research (can be from outside the university), and one additional tenured/tenure-track faculty member from the concentration department/conferring college. The dissertation advisor must be a full-time tenured or tenure-track member of the Northeastern University faculty.

## Alternate Course Path

Students have the option to complete core coursework in their first year of study. This curriculum pathway is mandatory for students whose admitting advisor is located outside of the Boston campus and elsewhere in the Northeastern network.

## Qualifying Examination

The qualification exam is an oral examination of the material covered in the core curriculum. The exam will be an hour long and consist of questions selected by network science faculty. Students will receive between 50 to 80 questions to review for one month before the exam—a subset of which will make up the exam.

All students are required to sit for the exam in the fall, typically in their third year of the PhD program. Students who fail to pass the qualifying exam on their first attempt are expected to retake it in the spring term.

Students following the alternate path may take the exam at the end of the first academic year, upon completion of the required core courses.

Students may only take the qualifying exam twice.

## Dissertation Proposal

Students must submit a written dissertation proposal to the dissertation committee. The proposal should identify relevant literature, the research problem, plan, and the potential impact on the field. The proposal will be presented in an open forum before a public audience and the dissertation committee, followed by questions from noncommittee members. The written proposal must be given to committee members at least two weeks before the oral presentation. After the presentation, the student will meet with the dissertation committee to address any concerns raised in either the written proposal or the presentation. The comprehensive exam must precede the final dissertation defense by at least one year.

Students may repeat the comprehensive examination once if they are unsuccessful.

## Degree Candidacy

A student is considered a PhD candidate upon completion of all required coursework with a minimum cumulative GPA of 3.000, satisfactory completion of the qualification exam, and satisfactory completion of the comprehensive exam.

## Dissertation Defense

A PhD student must complete and defend a dissertation involving original network science research. The dissertation defense must adhere to the dissertation policies of the College of Social Science and Humanities (<https://cssh.northeastern.edu/resources/theses-and-dissertations/>).

*Students who have completed required coursework with a cumulative GPA of 3.000 or better may be eligible to receive an MS in Network Science degree. In addition, students who do not qualify for the doctoral degree, but who have completed required coursework with a cumulative GPA of 3.000 or better, may be eligible to receive a terminal MS in Network Science degree. Note that no students will be admitted directly into the MS in Network Science to pursue a master's degree.*

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

## Milestones

Annual review  
Qualifying exam  
Dissertation committee  
Dissertation proposal  
PhD candidacy  
Dissertation defense

## Core Requirements

Code	Title	Hours
NETS 5116	Network Science 1	4
NETS 6116	Network Science 2	4

NETS 7332	Machine Learning with Graphs	4
NETS 7334	Social Networks	4
NETS 7335	Dynamical Processes in Complex Networks	4

## Specializations

Complete 20 additional semester hours in one of the following specializations or another course of study with written approval from your advisor.

- Computer Science (p. 345)
- Epidemiology (p. 346)
- Math (p. 346)
- Physics/Theory (p. 346)
- Social Science (p. 346)
- Independent (p. 346)

### COMPUTER SCIENCE SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
CS 6140 or CS 6220	Machine Learning Data Mining Techniques	4

### EPIDEMILOGY SPECIALIZATION

Code	Title	Hours
PHTH 5202	Introduction to Epidemiology	3
PHTH 6202	Intermediate Epidemiology	3

### MATH SPECIALIZATION

Code	Title	Hours
CS 5800	Algorithms	4
MATH 7233	Graph Theory	4

### PHYSICS/THEORY SPECIALIZATION

Code	Title	Hours
MATH 7233	Graph Theory	4
PHYS 7321	Computational Physics	4

### SOCIAL SCIENCE SPECIALIZATION

Code	Title	Hours
NETS 7350	Bayesian and Network Statistics	4
NETS 7360	Research Design for Social Networks	4

### INDEPENDENT SPECIALIZATION

Code	Title	Hours
Students must choose two courses related to their research area with approval from their advisor.		6–8

### ELECTIVES LIST

Code	Title	Hours
Select from the list below to complete the remaining 12–14 semester hours for the coursework requirement. Courses outside this list may be approved by the student's advisor.		12–14
CS 5800	Algorithms	
CS 6120	Natural Language Processing	
CS 6140	Machine Learning	
CS 6220	Data Mining Techniques	
CS 7180	Special Topics in Artificial Intelligence	
CS 7260	Visualization for Network Science	
CS 7295	Special Topics in Data Visualization	
MATH 7233	Graph Theory	
MATH 7243	Machine Learning and Statistical Learning Theory 1	
NETS 7341	Network Economics	
NETS 7350	Bayesian and Network Statistics	

NETS 7976	Directed Study
NETS 7983	Topics
PHYS 7305	Statistical Physics
PHYS 7321	Computational Physics

## Dissertation

Code	Title	Hours
<i>Precandidacy</i>		
NETS 8986 Research		
Students should register for NETS 8986 between completion of the qualification exam and proposal defense.		
<i>Dissertation</i>		
NETS 9990	Dissertation Term 1	
NETS 9991	Dissertation Term 2	
<i>Dissertation Continuation</i>		
Following completion of NETS 9990 and 9991, registration in the following is required each semester until the dissertation is completed:		
NETS 9996	Dissertation Continuation	

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Plan of Study

### Typical Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
Two specialization courses		8 NETS 7334	4
		One elective course	4
		12	12
Year 2			
Fall	Hours	Spring	Hours
NETS 7332		4 NETS 7335	4
One elective course		4 One elective course	4
		8	8
Year 3			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 8986	0
		0	0
Year 4			
Fall	Hours	Spring	Hours
NETS 8986		0 NETS 9990	0
		0	0
Year 5			
Fall	Hours	Spring	Hours
NETS 9991		0 NETS 9996	0
		0	0

**Total Hours: 40**

### Alternate Plan of Study

Year 1			
Fall	Hours	Spring	Hours
PHYS 5116		4 NETS 6116	4
NETS 7332		4 NETS 7334	4

One elective course		4 NETS 7335		4
		12		12
<b>Year 2</b>				
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	
Two specialization courses		8 Two elective courses		8
		8		8
<b>Year 3</b>				
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	
NETS 8986		0 NETS 8986		0
		0		0
<b>Year 4</b>				
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	
NETS 8986		0 NETS 9990		0
		0		0
<b>Year 5</b>				
<b>Fall</b>	<b>Hours</b>	<b>Spring</b>	<b>Hours</b>	
NETS 9991		0 NETS 9996		0
		0		0

**Total Hours: 40**

### Applied Quantitative Methods and Social Analysis, MS

The Master of Science in Applied Quantitative Methods and Social Analysis is an interdisciplinary, flexible, and innovative degree that focuses on quantitative research methods for social analysis strategies and techniques. The program integrates the interdisciplinary perspectives and methodological and analytical tools across the College of Social Sciences and Humanities. The program seeks to educate ambitious social scientists and analysts primed to deploy computational tools for social analysis and tackle social science questions of equity, hierarchy, social organization, and social systems. The 21st-century economy will increasingly demand a workforce capable of collecting, processing, analyzing, and interpreting large-scale data on human attributes, personal preferences, social attributes, and political behavior. In response, this program provides students with rigorous training in quantitative research and social science methods to address important questions of social inquiry. Emphasizing public dissemination of findings, the program prepares students to inform policymakers, decision makers in the private and public sectors, and the broader community. These skills prepare graduates to pursue analytical or research careers in corporations, nonprofits, and public services or to continue their education.

Students in this degree program will have the opportunity to gain advanced training in statistical analysis and research methodology aligned to key areas of strength in CSSH, including data analytics in the social sciences, computational social science, network analysis in the social sciences, statistical methods in the social sciences, information ethics for social analysis, geospatial analysis, and the digital humanities. Students will also have the opportunity to stack a range of graduate certificate programs into the master's degree.

The program will take advantage of various co-op opportunities—positions such as policy analysts, network scientists, econometricians, and crime analysts—that provide students a professional environment to integrate quantitative skills and social analysis. The learning opportunities in professional settings (private sector, government, or nonprofit sector) reinforce the development of advanced quantitative skills and their applied nature to contemporary social issues. Ultimately, the Master of Science in Applied Quantitative Methods and Social Analysis will position students to enter the labor force with the competitive advantage of these experiences and skills.

CSSH Graduate Programs General Regulations (p. 1031)

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
-

Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
<b>Core Requirements</b>		
INSH 6300	Research Methods in the Social Sciences	4
INSH 6500	Statistical Analysis	4

## Required Concentration

Complete one of the following concentrations:

- Computational Social Science (p. 1113)
- Data Analytics in the Social Sciences (p. 1113)
- Information Ethics for Social Analysis (p. 1114)
- Network Analysis in the Social Sciences (p. 1114)
- Statistical Methods in the Social Sciences (p. 1114)

## ELECTIVES

Code	Title	Hours
Complete 12 semester hours from the following:		
Concentration courses may not be double counted as elective courses.		
CRIM, INSH, POLS, PPUA, and/or SOCL at the 5000 level or higher		

## Optional Co-op Experience

Code	Title	Hours
Four-month co-ops require registration at 1 semester hour for one term. Longer co-ops require registration at 1 semester hour per term for two consecutive terms.		
INSH 6864	Experiential Integration	1-2
INSH 6964	Co-op Work Experience	

## Program Credit/GPA Requirements

32 total semester hours required (33-34 with optional co-op)

Minimum 3.000 GPA required

## COMPUTATIONAL SOCIAL SCIENCE

Code	Title	Hours
<b>Concentration Requirements</b>		
INSH 5302	Information Design and Visual Analytics	4
or INSH 5304	Social Network Analysis	
or POLS 7334	Social Networks	
or PPUA 5262	Big Data for Cities	
or PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
INSH 5303	Machine Learning in the Social Sciences	4
or DA 5030	Introduction to Data Mining/Machine Learning	
INSH 6406	Analyzing Complex Digitized Data	4
or INSH 5301	Introduction to Computational Statistics	

## DATA ANALYTICS IN THE SOCIAL SCIENCES

Code	Title	Hours
<b>Concentration Requirements</b>		
DA 5020	Collecting, Storing, and Retrieving Data	4
or DA 5030	Introduction to Data Mining/Machine Learning	
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4

**INFORMATION ETHICS FOR SOCIAL ANALYSIS**

Code	Title	Hours
<b>Concentration Requirements</b>		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	4
PHIL 5001 or PHIL 5002 or PHIL 5010	Global Justice Ethics and Public Policy AI Ethics	4
PHIL 5005	Information Ethics	4

**NETWORK ANALYSIS IN THE SOCIAL SCIENCES**

Code	Title	Hours
<b>Concentration Requirements</b>		
INSH 5301	Introduction to Computational Statistics	4
INSH 5302	Information Design and Visual Analytics	4
INSH 5304 or POLS 7334	Social Network Analysis Social Networks	4

**STATISTICAL METHODS IN THE SOCIAL SCIENCES**

Code	Title	Hours
<b>Concentration Requirements</b>		
INSH 5301	Introduction to Computational Statistics	4
INSH 7400	Quantitative Analysis	4
INSH 7500	Advanced Quantitative Analysis	4

**Complex Network Analysis, MS**

Complex network analysis is the quantitative study of interconnected systems that influence every aspect of our lives—from where we get our news and who we share ideas with, to how we travel and the people we interact with, to the products we purchase and the foods we eat. Networks are ubiquitous across natural and human-made systems, and their structure and dynamics can explain and help improve the greatest challenges of the next century, such as pandemics, food scarcity, cultural polarization, and climate change. Expertise in the emerging field of complex network analysis, within the landscape of the rapid growth of artificial intelligence and machine learning, forms the foundation of the next generation of thought leaders. Northeastern University leads the way in this burgeoning field, offering a unique master's degree program in complex network analysis methodologies. The program is designed to equip students with the conceptual and analytical tools needed to find patterns of connections in networked systems and apply these techniques in real-world settings. The curriculum includes industry-aligned concentration areas of focus, enabling graduates to apply complex network analysis skills in impactful careers in the public and private sectors as well as in research. The concentrations for this program correspond directly to the following industry sectors:

1. Public health and life sciences fields such as epidemiological modeling, public policy, informatics, and behavioral research
2. Social or urban science and research fields such as urban planning, social network research, economics, education, criminal science, or public policy
3. Finance or technological fields such as financial analytics, market research, or network analysis for business

In this degree program, students are admitted to the college associated with their concentration, and their degree is awarded by that college. The concentrations are associated with the following colleges:

- Complex Social Systems – College of Social Sciences and Humanities
- Economic and Technological Networks – Khoury College of Computer Sciences
- Population Health Dynamics – College of Science and Bouvé College of Health Sciences (*with student choice of college*)

Students will follow all policies associated with their home college.

**Program Requirements**

Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
INSH 5301	Introduction to Computational Statistics	4
NETS 5050	Fundamentals of Complex Networks	4
NETS 5051	Analyzing Complex Network Data	4
NETS 5052	Advanced Tools for Complex Network Analysis	4

NETS 5901	Visualizing Complex Networks	2
NETS 5902	Communicating Network Data	2

## Concentrations

Complete one of the following concentrations:

- Complex Social Systems (p. 1115) (College of Social Sciences and Humanities)
- Economic and Technological Networks (p. 1115) (Khoury College of Computer Sciences)
- Population Health Dynamics (p. 1116) (College of Science and Bouvé College of Health Sciences)

## Experiential Courses

Code	Title	Hours
Complete a total of 4 semester hours from the following (course may be repeated):		
NETS 6107	Complex Network Analysis Research Rotation	4
NETS 6108	Complex Network Analysis Capstone	
NETS 6990	Thesis	

## Optional Co-op

Code	Title	Hours
NETS 6000	Professional Development for Co-op	1
NETS 6964	Co-op Work Experience	0

## Program Credit/GPA Requirements

36–37 total semester hours required

Minimum 3.000 GPA required

### COMPLEX SOCIAL SYSTEMS CONCENTRATION

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
INSH 5304	Social Network Analysis	6-8
INSH 6304	Modeling and Analyzing Social Networks	
NETS 5311	Physical and Digital Human Traces	
NETS 5314	Complexity in Social Systems	
NETS 5360	Research Design for Social Networks	
PPUA 5262	Big Data for Cities	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

### ECONOMIC AND TECHNOLOGICAL NETWORKS

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
CS 7150	Deep Learning	6-8
DS 5220	Supervised Machine Learning and Learning Theory	
DS 5230	Unsupervised Machine Learning and Data Mining	
MISM 6212	Data Mining and Machine Learning for Business	
NETS 5411	Financial and Economic Networks	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**POPULATION HEALTH DYNAMICS CONCENTRATION**

Code	Title	Hours
<i>A total of 12 semester hours is required to complete this concentration.</i>		
Complete 6–8 semester hours from the following:		
BINF 6308	Bioinformatics Computational Methods 1	6-8
NETS 5126	Spreading on Networks: From Epidemics to Memes	
NETS 5515	Complex Network Analysis for Biological Systems	
PHTH 5210	Biostatistics in Public Health	
PHTH 6440	Advanced Methods in Biostatistics	
Complete 4–6 semester hours from the following:		
NETS 6061	Analyzing Higher-Order Networks	4-6
NETS 6063	Probabilistic Mathematics of Networks	
NETS 6099	Special Topics in Complex Networks	

**Computational Social Science, Graduate Certificate**

The certificate highlights how big data, computational analysis, and related techniques can be used to shed light on theoretical and policy questions in the fields of public policy, public health, sociology, criminal justice, political science, economics, computer science, and network science. The certificate will contribute to students' understanding of:

- How to collect, analyze, and interpret insights culled from applying computational analyses to big data in social science domains
- The ways in which computational analysis can be used to develop policy and evaluate policy outcomes and results

The field is new and developing rapidly, and employers are eager to hire students trained in this area—both because computational social science is at the cutting edge of interdisciplinary work and because it offers new opportunities for research and analysis. This certificate leverages the real-world relevance of big data, source data, machine learning, and predictive analytics, which are dominant aspects of the contemporary workplace landscape. The certificate is available on the Boston campus and online modalities.

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Core Requirements**

Code	Title	Hours
INSH 5301 or INSH 6406	Introduction to Computational Statistics Analyzing Complex Digitized Data	4
INSH 5303 or DA 5030	Machine Learning in the Social Sciences Introduction to Data Mining/Machine Learning	4

**Elective**

Code	Title	Hours
Complete 4 SH from the following:		
INSH 5302	Information Design and Visual Analytics	
POLS 7334	Social Networks	
PPUA 5263	Geographic Information Systems for Urban and Regional Policy	
PPUA 5262	Big Data for Cities	

**Program Credit/GPA Requirements**

12 total semester hours required

Minimum 3.000 GPA required

## Information Ethics, Graduate Certificate

The Graduate Certificate in Information Ethics is intended to help students build a working knowledge of the primary theories, frameworks, concepts, and issues in information ethics, as well as to help students develop robust skills in ethical analysis and evaluation.

Students who complete the certificate will be able to conduct comprehensive ethics and value analysis and assessment of emerging issues and problems related to such things as data collection, management, and use; design and implementation of artificial intelligence and machine learning; development and deployment of autonomous systems; and online, networked, and digital experiences and systems.

The certificate is open to students in any graduate program at Northeastern.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Complete all courses and requirements listed below unless otherwise indicated.

*Note:* At least two of the three courses taken to fulfill the certificate requirements must be PHIL courses.

### Core Requirements

Code	Title	Hours
Complete two of the following:		
CY 5240	Cyberlaw: Privacy, Ethics, and Digital Rights	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

### Elective

Code	Title	Hours
Complete one of the following. The elective course must be different than the core courses:		
PHIL 5001	Global Justice	
PHIL 5002	Ethics and Public Policy	
PHIL 5005	Information Ethics	
PHIL 5010	AI Ethics	

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

## Network Science, MS

This degree is only awarded to students who enter the doctoral degree program in Network Science without an advanced degree in the field. Students may qualify to receive an MS degree upon completing the program requirements listed here. Please see PhD Network Science (p. 344) for further information about this program. Note that no students will be admitted directly into this program to pursue a master's degree.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## Core Requirements

Code	Title	Hours
A grade of B or higher is required in each foundational course:		
NETS 6116	Network Science 2	4
PHYS 5116	Network Science 1	4
PHYS 7332	Network Science Data 2	4
PHYS 7335	Dynamical Processes in Complex Networks	4
POLS 7334	Social Networks	4

## Electives

See PhD Network Science (p. 344) for common elective options.

Code	Title	Hours
20 SH of elective coursework required.		20

## Program Credit/GPA Requirements

40 total semester hours required

Minimum 3.000 GPA required

## Women's, Gender, and Sexuality Studies, Graduate Certificate

Website (<https://cssh.northeastern.edu/wgss/>)

The Graduate Certificate in Women's, Gender, and Sexuality Studies (WGSS) is designed for students currently enrolled in a Northeastern University master's or doctoral program. The certificate aims to provide enhanced competency by:

- Analyzing contemporary feminist theoretical frameworks, methodologies, issues, and topics and their relation to established disciplines
- Focusing on the intersection of gender with sexuality, race, class, and other vectors of power and identity
- Broadening and enriching analytical skills in one or more disciplines while drawing on the interdisciplinary perspectives of WGSS
- Challenging the traditional separation of academic theory from political and professional practice

Prospective certificate students are advised initially to consult with the WGSS program director and the advisor in their home department to develop a plan for completing the certificate.

In addition to the College of Social Sciences and Humanities certificate, there is a specialized pathway for students enrolled in the Master of Public Health program (p. 710). These students are able to apply theories, concepts, and methods gained from the WGSS certificate to urban health issues. Students work closely with advisors in their home school and in WGSS to select a course of study to complete the certificate, including incorporating gender and sexuality studies into their MPH coursework as final projects/papers and naming a WGSS faculty member to their capstone committee, if using the capstone as an elective for the certificate. Students using the capstone toward their certificate must also enroll in a 1-credit directed study with the WGSS faculty who will sit on their committee. Note: Students pursuing the BS MPH accelerated program and WGSS certificate should wait until they have *matriculated* into the MPH program to declare the certificate and to begin coursework toward the WGSS certificate.

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Foundational Requirement

Code	Title	Hours
All students, regardless of disciplinary background, must complete one of the following:		
WMNS 6100	Theorizing Gender and Sexuality	4

WMNS 7100 or SOCL 7100	Queer Theory: Sexualities, Genders, Politics Queer Theory: Sexualities, Genders, Politics
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### General Option

Code	Title	Hours
<b>Electives</b>		
Complete two courses according to the instructions from the electives list (below the MPH option). At least one should come from outside the student's home department.		8

### MPH Option

Code	Title	Hours
MPH students should plan to take one foundational required course from the list above and to focus final projects in core MPH courses on gender/sexuality in public health.		
<b>Electives</b>		8
Complete 8 semester hours according to the instructions from the electives list. One course may be the capstone, if the topic selected focuses on gender and/or sexuality in connection to the selected urban health issue and the student enrolls in a 1-semester-hour directed study with the WGSS faculty member who will sit on the capstone committee.		

### Electives List

Code	Title	Hours
At least one course must come from outside the student's home discipline. Any foundational course not taken to complete the required foundational coursework may be taken as an elective but may not count as both the foundational requirement and an elective. Electives outside this list, particularly special topics courses not listed here, may be chosen in consultation with program director. Students may also consider courses at the Graduate Consortium for Studies of Gender, Culture, Women, and Sexuality (located at MIT). MPH students, in conversation with their advisors, may substitute PHTH 6910 for one elective.		
ECON 5292	Gender and Development Economics	
HIST 5240	Feminist Resistance	
PHTH 6910	Public Health Capstone (with 1-SH directed study)	
SOCL 5240	Feminist Resistance	
SOCL 7100	Queer Theory: Sexualities, Genders, Politics	
SOCL 7273	Gender and Social Policy	
WMNS 5240	Feminist Resistance	
WMNS 6100	Theorizing Gender and Sexuality (if not taken as core course)	
WMNS 7100	Queer Theory: Sexualities, Genders, Politics (if not taken as core course)	
WMNS 7900	Special Topics in Women's, Gender, and Sexuality Studies	
WMNS 7976	Directed Study	

### Program Credit/GPA Requirements

12 total semester hours required  
Minimum 3.000 GPA required

#### Mills College at Northeastern

Website (<https://mills.northeastern.edu/>)

**Beth D. Kochly, PhD**, Dean of Mills College at Northeastern

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Mills College at Northeastern is a community of teachers, scholars, researchers, leaders, and change-makers rooted in the diverse Bay Area. Through our teaching and scholarship, we promote social and community accountability, diversity, equity and inclusion, and environmental sustainability. We prepare students to make an impact in the world by building on Oakland's roots in activism and leveraging our strengths in social justice, equity, meaningful partnerships, and academic excellence. We are committed to furthering the university's mission of diverse and inclusive experiential learning and research on our beautiful campus, the surrounding community, and beyond. We strive to foster learning and well-being by building

a curriculum, praxis, and research focus that are thoughtful, intentional, and of the highest quality. Our graduate and undergraduate programs will engage students in transformative, important conversations and provide a range of opportunities for personal and professional growth. This foundation prepares students to lead meaningful change in their chosen fields.

## **Programs**

### **Master of Arts (MA)**

- Early Childhood Education (p. 1120)
- Educational Leadership (p. 1122)
- Multiple Subject Education (p. 1123)
- Single Subject Education (p. 1124)

### **Graduate Certificate**

- AI Applications (p. 1126)

## **Early Childhood Education, MA**

This program is designed to prepare our students to work as leaders in teaching or administration in early childhood settings, including preschools and child development programs. In addition, the program prepares students to teach early childhood education topics in community colleges or adult education programs. Our students often continue their education to pursue research or doctoral degrees, as well as other forms of professional leadership. The program provides a strong foundation in child development and in developmentally, culturally, and linguistically responsive practices. The full-time MA programs can be pursued alongside the following teaching credentials: early childhood special education, multiple subjects (for K–8 teaching), or educational leadership.

### **Special Education Credential**

In combination with the early childhood education MA, this program prepares students to work in early intervention and preschool special education settings with infants and young children who have developmental disabilities. Graduates see that working with families, caregivers, and communities is integral to the education and care of young children with special needs. (See program details for specific information on the multiple subjects and administrative services credentials.)

### **COURSEWORK**

A total of 42 semester hours are required to earn the Master of Arts in Early Childhood Education with coursework leading to eligibility for the Special Education Credential. Coursework integrates theory and practice to prepare students to teach in urban settings and is guided by an overarching concern for social justice. All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Education Specialist, Early Childhood Special Education Credential, in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

### **FIELDWORK**

The early childhood education department maintains the belief that coursework and fieldwork must be integrated. Therefore, courses have assignments requiring engagement in educational settings, and students are placed in experiential learning/educational fieldwork every semester of the two-year program. During a student's first year, they are placed at the Mills College Children's School, where they are closely mentored by experienced and knowledgeable early childhood professionals. Students participate in weekly reflective circles with team members, where they discuss instructional decisions and interventions, receive feedback, and identify the next steps for supporting children and families. During the second year, student teaching occurs in an early intervention setting and a preschool/kindergarten setting. In their field placements, students have an opportunity to demonstrate their understanding of effective early intervention and preschool special education. These experiential learning experiences total over 900 hours and therefore far exceed the 600 hours of fieldwork required by the state accrediting body, the California Commission on Teacher Credentialing. Throughout the course sequence of the ECSE program, students compile a digital portfolio, which includes course assignments such as reflection pieces, presentations, and papers. The portfolio provides evidence of varied experiences, depth of knowledge, and critical reflection around instruction gained during the program.

### **Program Requirements**

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- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.
-

*Please note:* All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Education Specialist, Early Childhood Special Education Credential, in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

## Required Courses

Code	Title	Hours
EDUT 6210	Graduate Seminar: Research in Education 1	3
EDUT 6211	Graduate Seminar: Research in Education 2	3
Complete at least two of the following (all four courses are required for the Early Childhood Special Education Concentration):		6-12
EDUT 6202	Children with Special Needs: Infants and Young Children	
EDUT 6203	Theory and Practice of Early Childhood Education 1: Infants, Toddlers, and Young Children	
EDUT 6204	Theory and Practice of Early Childhood Education 2: Infants, Toddlers, and Young Children	
EDUT 6213	Language Development: Literacy, Communication, and Multilingualism	

## Concentration Options

Complete one of the following concentrations:

- Administrative Services (p. 1121)
- Early Childhood Special Education (p. 1121)
- Multiple Subject Education (p. 1122)

## Program Credit/GPA Requirements

39–42 total semester hours required

Minimum 3.000 GPA required

### CONCENTRATION IN ADMINISTRATIVE SERVICES

Coursework that prepares students for the **Administrative Services Credential** is listed below:

Code	Title	Hours
EDUT 6300	School Law and Public Policy	3
EDUT 6301	Instructional Leadership	4
EDUT 6302	Field Experience 1: Educational Leadership	2
EDUT 6303	Field Experience 2: Educational Leadership	2
EDUT 6304	Working with Families and the Community	3
EDUT 6305	Human Resource Management in Education	4
EDUT 6306	School Leadership	4
EDUT 6307	Fiscal and Business Services	4
EDUT 6308	Trauma-Informed Leadership	4

### CONCENTRATION IN EARLY CHILDHOOD SPECIAL EDUCATION

Coursework that prepares students for the **Special Education Credential** is listed below:

Code	Title	Hours
EDUT 6200	Cultivating Critical Consciousness in Practice	3
EDUT 6201	Legal Aspects and Program Design of Special Education	3
EDUT 6202	Children with Special Needs: Infants and Young Children	3
EDUT 6203	Theory and Practice of Early Childhood Education 1: Infants, Toddlers, and Young Children	3
EDUT 6204	Theory and Practice of Early Childhood Education 2: Infants, Toddlers, and Young Children	3
EDUT 6205	Family Systems and Cultural Diversity	3
EDUT 6206	Assessment and Intervention for Children with Special Needs	3
EDUT 6207	Positive Behavior Support and Intervention	3
EDUT 6208	Field Experience in Early Childhood Special Education 1	3
EDUT 6209	Field Experience in Early Childhood Special Education 2	3

EDUT 6212	Leadership and Administration in Early Childhood Programs	3
EDUT 6213	Language Development: Literacy, Communication, and Multilingualism	3

### CONCENTRATION IN MULTIPLE SUBJECT EDUCATION

Coursework that prepares students for the **Multiple Subject Education Credential** is listed below:

Code	Title	Hours
EDUT 6100	Sociopolitical Foundations 1	2
EDUT 6101	Sociopolitical Foundations 2	1
EDUT 6102	Sociopolitical Foundations 3	1
EDUT 6103	Human and Community Development 1	2
EDUT 6104	Human and Community Development 2	1
EDUT 6106	Multiliteracies 1—Multidiscipline	2
EDUT 6107	Multiliteracies 2—Multiple Subjects	1
EDUT 6112	Methodologies of English-Language Development and Content Instruction 1	2
EDUT 6115	Curriculum and Instruction 1—Multiple Subjects	2
EDUT 6116	Curriculum and Instruction 2—Multiple Subjects	2
EDUT 6117	Curriculum and Instruction 3—Multiple Subjects	2
EDUT 6124	Pedagogical Content Knowledge Lab 1—Multiple Subjects	2
EDUT 6125	Pedagogical Content Knowledge Lab 2—Multiple Subjects	3
EDUT 6126	Pedagogical Content Knowledge Lab 3—Multiple Subjects	3
EDUT 6136	Perspectives on Diversity, Equity, and Assessment	2

### Educational Leadership, MA

This program is designed to prepare students for leadership positions in public educational institutions and emphasizes developmental and constructivist approaches to education. School leaders have an opportunity to test theory in practice, anticipate consequences, and evaluate outcomes in a wide range of educational settings. Graduates have a strong record of becoming successful school administrators and leaders in educational transformation. The Administrative Services Credential can be earned with the Master of Arts in Educational Leadership.

### Administrative Services Credential

The Master of Arts in Educational Leadership includes coursework conducive to the Administrative Services Credential and prepares students for positions as administrators in K–12 public schools in the state of California. The ASC is required for administrative roles in all K–12 public schools in California; for example, the ASC is required for principals, assistant principals, superintendents, curriculum directors, and all other school administrator positions in all public schools across the state.

This credential program emphasizes both developmental and constructivist approaches to education. School leaders test theory in practice, anticipate consequences, and evaluate outcomes in a wide range of educational settings. Graduates have a strong record of becoming successful school administrators and leaders in educational transformation and school leadership. Graduates of the program are employed in 21 Bay Area school districts, including those in Alameda, Contra Costa, Sacramento, San Francisco, San Mateo, and Santa Clara counties. After completing courses required for the ASC, program graduates work with a commission-approved administrative services induction program to obtain a recommendation for the Clear Administrative Services Credential.

### COURSEWORK

A total of 30 semester hours are required to earn the Master of Arts in Educational Leadership with the Administrative Services Credential. All courses offered through the educational leadership program may be applied to the MA, and the course of study will be determined by a student in partnership with their Mills College at Northeastern University faculty advisor. In most cases, it is possible to tailor the MA to an individual candidate's interests and specific career goals. All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the five-year preliminary Administrative Services Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

### FIELDWORK

The program values the students' ability to perform well and the rigor of their research. However, the real test of a novice administrator is at the school site, where they may use their growing knowledge and skills in a leadership capacity. Students are assigned mentor principals and field supervisors who support their leadership growth through reflective conversations, advice, and by modeling appropriate practice.

### Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

**Please note:** All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the five-year preliminary Administrative Services Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

## Required Courses

Code	Title	Hours
EDUT 6300	School Law and Public Policy	3
EDUT 6301	Instructional Leadership	4
EDUT 6302	Field Experience 1: Educational Leadership	2
EDUT 6303	Field Experience 2: Educational Leadership	2
EDUT 6304	Working with Families and the Community	3
EDUT 6305	Human Resource Management in Education	4
EDUT 6306	School Leadership	4
EDUT 6307	Fiscal and Business Services	4
EDUT 6308	Trauma-Informed Leadership	4

## Program Credit/GPA Requirements

30 total semester hours required

Minimum 3.000 GPA required

### Multiple Subject Education, MA

The Master of Arts in Multiple Subject Education is an Educators for Liberation, Justice, and Joy program administered by the Mills College at Northeastern University's School of Education in Oakland, California. This program aims to meet the urgent need for elementary schoolteachers whose teaching embodies racial and gender justice for educational equity principles, guided by an inquiry stance toward practice. The program provides beginning teachers with the skills and requirements for a California Preliminary Multiple Subject Credential while completing classroom research. Students may follow either a preservice or an internship pathway toward the credential and subsequent MA.

## Multiple Subject Credential

### COURSEWORK

A total of 37 semester hours are required to earn the Master of Arts in Multiple Subject Education with the Multiple Subject Credential. The coursework outlined in the Multiple Subject Credential program is designed to satisfy both the requirements of the California teaching credential and lays the foundation for the MA in Multiple Subject Education. With the addition of two inquiry-oriented master's-level courses over the following academic year and the completion of their inquiry project, students will earn their Master of Arts degree. All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Multiple Subject Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

### FIELDWORK

All students are paired with a university-appointed coaching supervisor who provides guidance and feedback on their curriculum and pedagogy through a minimum of 12 observations during the school year, which must adhere to the six principles of the Teacher Performance Expectations as outlined by the California Commission on Teacher Credentialing. The successful completion of the ELJJ coursework, fieldwork, standardized exams, portfolio assessment, and all other requirements outlined by the CCTC will result in a recommendation from the ELJJ to the CCTC for a Preliminary Single Subject Credential. This will allow the graduate to teach in their discipline-specified area in a public school in the state of California. Through the National Association of State Directors of Teacher Education and Certification Interstate Agreement, credential holders of valid teaching state credentials, licenses, or certificates from a participating state may transfer these to another participating state, under certain conditions that must be confirmed by the receiving state's education department.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.

- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

*Please note:* All courses listed below (with the exception of EDUT 6210 Graduate Seminar: Research in Education 1 and EDUT 6211 Graduate Seminar: Research in Education 2), along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for the Preliminary Multiple Subject Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

## Required Courses

Code	Title	Hours
EDUT 6100	Sociopolitical Foundations 1	2
EDUT 6101	Sociopolitical Foundations 2	1
EDUT 6102	Sociopolitical Foundations 3	1
EDUT 6103	Human and Community Development 1	2
EDUT 6104	Human and Community Development 2	1
EDUT 6106	Multiliteracies 1—Multidiscipline	2
EDUT 6107	Multiliteracies 2—Multiple Subjects	1
EDUT 6108	Multiliteracies 3—Multiple Subjects	2
EDUT 6112	Methodologies of English-Language Development and Content Instruction 1	2
EDUT 6113	Methodologies of English-Language Development and Content Instruction 2	1
EDUT 6115	Curriculum and Instruction 1—Multiple Subjects	2
EDUT 6116	Curriculum and Instruction 2—Multiple Subjects	2
EDUT 6117	Curriculum and Instruction 3—Multiple Subjects	2
EDUT 6124	Pedagogical Content Knowledge Lab 1—Multiple Subjects	2
EDUT 6125	Pedagogical Content Knowledge Lab 2—Multiple Subjects	3
EDUT 6126	Pedagogical Content Knowledge Lab 3—Multiple Subjects	3
EDUT 6136	Perspectives on Diversity, Equity, and Assessment	2
EDUT 6210	Graduate Seminar: Research in Education 1	3
EDUT 6211	Graduate Seminar: Research in Education 2	3

## Program Credit/GPA Requirements

37 total semester hours required

Minimum 3.000 GPA required

### Single Subject Education, MA

The Educators for Liberation, Justice, and Joy program is designed to prepare graduate students to teach art, English, social science, Spanish or French, science, technology, engineering, or mathematics while earning their California Single Subject Credential and Master of Arts degree. The ELJJ program centers on racial and gender justice for educational equity and access. The program is designed around praxis as the core endeavor of teaching and teacher education, embracing critical reflection and practice to disrupt dominant ideologies and inequities. We utilize a cognitive apprenticeship model that combines coaching and inquiry and situates teacher learning within a school-based classroom. The program relies on an interdisciplinary, cross-grade, cohort community model that builds on the strengths of sociocultural learning theory. We believe that teachers must attend to the positive development of the whole child by successfully integrating culturally relevant and sustaining pedagogy, critical pedagogy, humanizing education, academic rigor, creative expression, and joy.

### Single Subject Credential

#### SINGLE SUBJECT CREDENTIAL (HUMANITIES)

The Single Subject Credential (Humanities) track prepares students to teach art, English, social science, or Spanish or French as a foreign language.

#### SINGLE SUBJECT CREDENTIAL (MATH/SCIENCE)

The Single Subject Credential (Math/Science) track prepares students to teach science, technology, engineering, and mathematics in grades 6–12, particularly in urban public schools.

## COURSEWORK

A total of 36 semester hours are required to earn the Master of Arts in Single Subject Education with the Single Subject Credential (Humanities or Math/Science). The coursework outlined in the Single Subject Credential program is designed to satisfy both the requirements of the California teaching credential and lay the foundation for the Master of Arts in Single Subject Education. With the addition of two inquiry-oriented master's-level courses over the following academic year and the completion of their inquiry project, students will earn their Master of Arts degree. All courses listed below, along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for a Preliminary Single Subject Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

## FIELDWORK

All students are paired with a university-appointed coaching supervisor who provides guidance and feedback on their curriculum and pedagogy through a minimum of 12 observations during the school year, which must adhere to the six principles of the Teacher Performance Expectations as outlined by the California Commission on Teacher Credentialing. The successful completion of the ELJJ coursework, fieldwork, standardized exams, portfolio assessment, and all other requirements outlined by the CCTC will result in a recommendation from the ELJJ to the CCTC for a Preliminary Single Subject Teaching Credential. This will allow the graduate to teach in their discipline-specified area in a public school in the state of California. Through the National Association of State Directors of Teacher Education and Certification Interstate Agreement, credential holders of valid teaching state credentials, licenses, or certificates from a participating state may transfer these to another participating state, under certain conditions that must be confirmed by the receiving state's education department.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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*Please note:* All courses listed below (with the exception of EDUT 6210 Graduate Seminar: Research in Education 1 and EDUT 6211 Graduate Seminar: Research in Education 2), along with state-mandated fieldwork and assessments, fulfill the requirements to meet eligibility for a Preliminary Single Subject Credential in the state of California. The final authority to grant a credential lies with the Commission on Teacher Credentialing.

## Required Courses

Code	Title	Hours
EDUT 6100	Sociopolitical Foundations 1	2
EDUT 6101	Sociopolitical Foundations 2	1
EDUT 6102	Sociopolitical Foundations 3	1
EDUT 6103	Human and Community Development 1	2
EDUT 6104	Human and Community Development 2	1
EDUT 6109	Multiliteracies 1—Single Subject	2
EDUT 6110	Multiliteracies 2—Single Subject	1
EDUT 6112	Methodologies of English-Language Development and Content Instruction 1	2
EDUT 6113	Methodologies of English-Language Development and Content Instruction 2	1
EDUT 6127	Pedagogical Content Knowledge Lab 1—Single Subject	2
EDUT 6128	Pedagogical Content Knowledge Lab 2—Single Subject	3
EDUT 6129	Pedagogical Content Knowledge Lab 3—Single Subject	3
EDUT 6136	Perspectives on Diversity, Equity, and Assessment	2
EDUT 6210	Graduate Seminar: Research in Education 1	3
EDUT 6211	Graduate Seminar: Research in Education 2	3

Complete one of the following tracks:

- Single Subject (Humanities) (p. 1126)
- Single Subject (Math/Science) (p. 1126)

## Program Credit/GPA Requirements

36 total semester hours required

Minimum 3.000 GPA required

**SINGLE SUBJECT (HUMANITIES) TRACK**

Code	Title	Hours
EDUT 6118	Curriculum and Instruction 1—Single Subject, Humanities	2
EDUT 6119	Curriculum and Instruction 2—Single Subject, Humanities	2
EDUT 6120	Curriculum and Instruction 3—Single Subject, Humanities	2
EDUT 6130	Survey of Humanities in Secondary Schools—Single Subject	1

**SINGLE SUBJECT (MATH/SCIENCE) TRACK**

Code	Title	Hours
EDUT 6121	Curriculum and Instruction 1—Single Subject, Math/Science	2
EDUT 6122	Curriculum and Instruction 2—Single Subject, Math/Science	2
EDUT 6123	Curriculum and Instruction 3—Single Subject, Math/Science	2
EDUT 6133	Survey of STEM—Single Subject	1

**AI Applications, Graduate Certificate**

As artificial intelligence and machine learning become ubiquitous across industries, workers at all levels are seeking practical knowledge about AI: its implications, limitations, and uses across various domains. The Graduate Certificate in AI Applications is designed for professionals with a broad spectrum of academic and professional expertise seeking to harness the power of AI within their respective industries. The program offers professionals a comprehensive understanding of AI fundamentals and the opportunity to learn to effectively apply AI applications to their own contexts and products. Through a blend of theoretical knowledge and practical skills development, professionals will be equipped with the tools necessary to make informed decisions about when and how to leverage AI technologies.

The curriculum offers instruction on how to leverage AI technologies responsibly, ethically, and effectively within organizations and how to advocate for the responsible use of AI and mitigate risks associated with AI deployment, while also understanding the human-centered aspects of AI development and implementation.

Students are admitted to the certificate program by one of the following colleges and students follow all policies associated with their home college:

- Bouvé College of Health Sciences
- College of Arts, Media, and Design
- College of Engineering
- D'Amore-McKim School of Business
- Mills College at Northeastern

**Program Requirements**

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

**Required Courses**

Code	Title	Hours
ARTG 6460	Human-Centered AI	4
CS 5047	Exploring AI Trends and Tools	4
PHIL 5110	Responsible AI	4

**Experiential Courses**

Code	Title	Hours
Complete 4 semester hours from the following:		
EDUT 6150	AI in Education	4
HLTH 5800	AI Across the Health Sciences	

IE 5640	Data Mining for Engineering Applications
JRNL 6460	AI in Media Industries
MISM 6250	Strategic AI for Business

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Gordon Institute of Engineering Leadership

Website (<https://gordon.northeastern.edu/>)

#### Simon Pitts

Director and Head—Gordon Institute of Engineering Leadership

415 Stearns Center  
617.373.4800  
617.373.7680 (fax)

The Gordon Institute of Engineering Leadership offers a graduate certificate that pairs with over 20 master's programs in the College of Engineering, College of Science, and Khoury College of Computer Sciences. The Gordon program is a transformational graduate program designed to build a future corps of engineering leadership professionals. GIEL seeks to accelerate leadership development capability in an engineering context through a concentrated curriculum that inculcates both the psychological skills and capabilities needed to lead engineers in parallel with technical skills to successfully engineer products to customers and markets. The program teaches relevant leadership theory followed by practice in leadership laboratories. Technical product development and scientific principles courses are followed by the completion of a market-worthy challenge project. This learning framework is supplemented with three-way mentoring from industry, faculty, and program mentors. Graduates of the program, known as Gordon Fellows, have an opportunity to gain the knowledge, skills, and attitudes required to successfully lead engineering teams. They stand out from their peers in their ability to invent, innovate, and implement engineering projects from concept to market success. Participation in GIEL accelerates Gordon Fellows' careers, making them more valuable to their company.

## The Challenge

When relatively unseasoned engineers run teams or projects, most fail to satisfy all of the project's critical requirements—missing the mark in functionality, performance, quality, time-to-market, cost, or other key objectives.

This shortfall exists because engineers enter the workforce without critical skills related to:

- Competitiveness
- Taking responsibility to prevent failure
- Market and customer focus
- Influencing and motivating skills
- Interdisciplinary decision-making and teamwork capability
- Simultaneous optimization of all elements of performance, quality, cost, and timing
- Front-loading the engineering process
- Financial acumen
- Big-picture engineering
- Leadership abilities and organizational social awareness
- Enterprise understanding
- Program management tools and processes
- Designing to avoid failure modes
- Designing for lean manufacture

## The Mission

GIEL's mission is to create an elite cadre of engineering leaders who stand out from their peers in their ability to invent, innovate, and implement engineering projects from concept to market success.

These leaders will demonstrate an exceptional ability to lead engineering teams by providing purpose, direction, and motivation to influence others to achieve their collective goals.

## The Method

To close the gaps and realize its mission, GIEL concentrates on the knowledge, skills, and abilities that reside at the intersection of engineering and leadership.

At the end of the program, Gordon Fellows emerge with the awareness, confidence, vision, and technical dexterity to drive positive change within their organizations and society.

## Admissions

GIEL candidates must apply for and be admitted to both the Northeastern University Graduate School of Engineering and the Gordon Institute of Engineering Leadership.

Students pursue GIEL as part of a Master of Science degree in the engineering discipline of their choice or as a stand-alone graduate certificate. Upon completion of a Master of Science degree, students earn both the Master of Science degree in the discipline of choice and a Graduate Certificate in Engineering Leadership. Students who already hold a graduate degree in engineering or have greater than three years of engineering work experience can complete the program to earn a Graduate Certificate in Engineering Leadership. The core GIEL curriculum takes place during one calendar year (September–July), and additional coursework required for the Master of Science degree can be pursued before, after, or in parallel with GIEL.

## Programs

### Graduate Certificates

- Engineering Leadership (p. 609)
- Technology Leadership (p. 1130)

### Engineering Leadership, Graduate Certificate

The Gordon Engineering Leadership Program is a transformational, technical, and challenging graduate-level learning experience targeted for engineering professionals.

The Gordon Engineering Leadership Program directed by the Gordon Institute of Engineering Leadership offers a graduate certificate that pairs with over 25 master's degrees in the College of Engineering, College of Science, and Khoury College of Computer Sciences. The Gordon Program is a transformational graduate program designed to build a future corps of engineering leadership professionals.

Pursuing the graduate certificate allows participants to:

- Take part in a hands-on curriculum taught by industry-experienced professors
- Work with peers from across engineering fields on leadership skills development
- Receive one-on-one mentoring from industry experts and faculty

The Gordon Engineering Leadership Program anchors around an intense, market-worthy challenge project based on your organization's strategic needs. This is a unique opportunity to apply your classroom experience in a professional setting, potentially further accelerating your career.

### How to Earn a Graduate Certificate in Engineering Leadership

If you already have a Master of Science, then you can complete the one-year program to earn a Graduate Certificate in Engineering Leadership.

If you do not have a Master of Science, then you can still be considered for the Graduate Certificate in Engineering Leadership if you have at least three years of engineering work experience.

Additional information can be found on the Gordon Engineering Leadership Program website. (<https://gordon.northeastern.edu>)

### Beyond a Graduate Certificate

Most candidates pursue the Gordon Engineering Leadership Program as part of a Master of Science degree in the engineering discipline of their choice. Upon completion, they earn both a Master of Science degree and a Graduate Certificate in Engineering Leadership.

Students can enroll in the Engineering Leadership Graduate Certificate while pursuing the following degrees:

- MS Advanced and Intelligent Manufacturing (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/advanced-and-intelligent-manufacturing/>)
- MS Biotechnology (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-science/ms-in-biotechnology/>)
- MS Climate Science and Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/climate-science/>)
- MS Computer Science (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/computer-science/>)
- MS Cybersecurity (<https://gordon.northeastern.edu/certificate-and-degree-options/khoury-college-of-computer-sciences/ms-in-information-assurance-and-cyber-security/>)

- MS Data Analytics Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-data-analytics-engineering/>)
- MS Engineering and Public Policy (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-and-public-policy/>)
- MS Human Factors (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/human-factors/>)
- MS Robotics (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/robotics/>)
- MS Telecommunication Networks (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-telecommunication-networks/>)
- MSBioE Bioengineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-bioengineering/>)
- MSChE Chemical Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/chemical-engineering/>)
- MSCivE Civil Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-civil-engineering/>)
- MSCSE Software Engineering Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-computer-systems-engineering/>)
- MSECE Electrical and Computer Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering/>)
- MSECEL Electrical and Computer Engineering Leadership (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-electrical-and-computer-engineering-leadership/>)
- MSEM Engineering Management (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-engineering-management/>)
- MSENE Energy Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-energy-systems/>)
- MSEnvE Environmental Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-environmental-engineering/>)
- MSIE Industrial Engineering (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-industrial-engineering/>)
- MSIS Information Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-information-systems/>)
- MSME Mechanical Engineering (select concentrations) (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-mechanical-engineering/>)
- MSOR Operations Research (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-operations-research/>)
- MSSBS Sustainable Building Systems (<https://gordon.northeastern.edu/certificate-and-degree-options/college-of-engineering/ms-in-sustainable-building-systems/>)

## Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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Complete all courses and requirements listed below unless otherwise indicated.

## Core Requirements

Code	Title	Hours
ENLR 5121	Engineering Leadership 1	2
ENLR 5122	Engineering Leadership 2	2
ENLR 5131	Scientific Foundations of Engineering 1	2
ENLR 5132	Scientific Foundations of Engineering 2	2
Complete the following two courses based on the discipline of your master's program:		
ENLR 7440 or EECE 7440 or ENSY 7440 or IE 7440 or ME 7440 or TELR 7440	Engineering Leadership Challenge Project 1 Electrical and Computer Engineering Leadership Challenge Project 1 Energy Systems Engineering Leadership Challenge Project 1 Industrial Engineering Leadership Challenge Project 1 Mechanical Engineering Leadership Challenge Project 1 Technology Leadership Challenge Project 1	4
ENLR 7442 or EECE 7442	Engineering Leadership Challenge Project 2 Electrical and Computer Engineering Leadership Challenge Project 2	4

or ENSY 7442	Energy Systems Engineering Leadership Challenge Project 2
or IE 7442	Industrial Engineering Leadership Challenge Project 2
or ME 7442	Mechanical Engineering Leadership Challenge Project 2
or TELR 7442	Technology Leadership Challenge Project 2

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Technology Leadership, Graduate Certificate

The Graduate Certificate in Technology Leadership offered by the Gordon Institute of Engineering Leadership (GIEL) is a transformational graduate program designed to build a future corps of technology leadership professionals. GIEL seeks to accelerate leadership development capability in a technical context through a concentrated curriculum that inculcates both the psychological skills and capabilities needed to lead in parallel with technical skills to successfully release products to customers and markets. The program teaches relevant leadership theory followed by practice in leadership laboratories. Technical product development and scientific principles courses are followed by the completion of a market-worthy challenge project. This learning framework is supplemented with three-way mentoring from industry, faculty, and program mentors. Graduates of the program, known as Gordon Fellows, have an opportunity to gain the knowledge, skills, and attitudes required to successfully lead technical teams. They stand out from their peers in their ability to invent, innovate, and implement technology projects from concept to market success. Participation in GIEL accelerates Gordon Fellows' careers, making them more valuable to their company.

## The Challenge

When relatively unseasoned professionals run teams or projects, most fail to satisfy all of the project's critical requirements—missing the mark in functionality, performance, quality, time-to-market, cost, or other key objectives.

This shortfall exists because professionals enter the workforce without critical skills related to:

- Competitiveness
- Taking responsibility to prevent failure
- Market and customer focus
- Influencing and motivating skills
- Interdisciplinary decision making and teamwork capability
- Simultaneous optimization of all elements of performance, quality, cost, and timing
- Front-loading the technology delivery process
- Financial acumen
- Big-picture engineering
- Leadership abilities and organizational social awareness
- Enterprise understanding
- Program management tools and processes
- Designing to avoid failure modes
- Designing for lean manufacture

## The Mission

GIEL's mission is to create an elite cadre of technology leaders who stand out from their peers in their ability to invent, innovate, and implement technical projects from concept to market success.

These leaders will demonstrate an exceptional ability to lead teams by providing purpose, direction, and motivation to influence others to achieve their collective goals.

## The Method

To close the gaps and realize its mission, GIEL concentrates on the knowledge, skills, and abilities that reside at the intersection of technology and leadership.

At the end of the program, Gordon Fellows emerge with the awareness, confidence, vision, and technical dexterity to drive positive change within their organizations and society.

## Admissions

Candidates must apply for and be admitted to both a master's degree program at Northeastern and the Graduate Certificate in Technology Leadership.

Students pursue the Graduate Certificate in Technology Leadership as part of a master's degree or as a stand-alone graduate certificate. Upon completion of a Master of Science degree, students earn both the Master of Science degree in the discipline of choice and a Graduate Certificate in Technology Leadership. Students who already hold a graduate degree or have greater than three years' industry work experience can complete the program to earn a stand-alone Graduate Certificate in Technology Leadership. The core GIEL curriculum takes place during one calendar year (September–July), and additional coursework required for the Master of Science degree can be pursued before, after, or in parallel with GIEL.

For more information contact Amy Manley, Director of Admissions and Marketing, (617) 373-4800 or [a.manley@northeastern.edu](mailto:a.manley@northeastern.edu).

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

Code	Title	Hours
TELR 5121	Technology Leadership 1	2
TELR 5122	Technology Leadership 2	2
TELR 5131	Scientific Foundations of Technology 1	2
TELR 5132	Scientific Foundations of Technology 2	2
TELR 7440	Technology Leadership Challenge Project 1	4
TELR 7442	Technology Leadership Challenge Project 2	4

<sup>1</sup> The Scientific Foundations of Technology 1 (TELR 5131) and Scientific Foundations of Technology 2 (TELR 5132) requirements may be met by completion of another course upon approval of the program director.

## Program Credit/GPA Requirements

16 total semester hours required

Minimum 3.000 GPA required

### Additional Programs

- Global Doctoral Research, Graduate Certificate (p. 1131)
- Postsecondary Teaching, Graduate Certificate (p. 1132)

### Global Doctoral Research, Graduate Certificate

The Graduate Certificate in Global Doctoral Research is available to PhD students who are advised by Northeastern faculty or students enrolled in a PhD program at another institution who are co-advised by Northeastern faculty. The intent is to facilitate, encourage, and recognize the pedagogical and research benefits resulting from doctoral study in different cultural contexts. The intent is to guide students toward a set of globally meaningful education and research activities that infuse global values and perspectives into their research education.

## Program Requirements

- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
- Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

## 1132 Postsecondary Teaching, Graduate Certificate

Complete all courses and requirements listed below unless otherwise indicated.

### Core Requirements

Code	Title	Hours
INPR 5900	Global and Intercultural Communication for Doctoral Students	2
INPR 7970	Global Research Integration	2

### Electives

Code	Title	Hours
Complete 8 semester hours from the following:		
INPR 6200	Global Research Literacies	8
INPR 7900	Global Research Experience	
INPR 7995	Global Experiential Project	

Any PhD-level course with an international component may be applied to fulfillment of this requirement with prior approval from the program advisor.

### Additional Requirements

- All global doctoral research students must have dissertation committee members from at least two different locations and spend time in at least two locations doing research.
- Students enrolled in a PhD program at another institution must spend time at a Northeastern University location and have a Northeastern faculty member on their dissertation committee to complete certificate requirements.
- The insights gained from the global experience must be a component of the dissertation defense.

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

### Postsecondary Teaching, Graduate Certificate

The Certificate in Postsecondary Teaching prepares graduate students to be effective teachers and educators both inside and outside the classroom. It focuses on both didactic training in best practices and pedagogy around traditional teaching as well as online teaching. Finally, it is anchored by a teaching practicum where students put into practice what they have learned.

### Program Requirements

- 
- Concentrations and course offerings may vary by campus and/or by program modality. Please consult with your advisor or admissions coach for the course availability each term at your campus or within your program modality.
  - Certain options within the program may be *required* at certain campuses or for certain program modalities. Please consult with your advisor or admissions coach for requirements at your campus or for your program modality.

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### Requirements

Code	Title	Hours
<b>Required Courses</b>		
INPR 5100	Foundations of Evidence-based Postsecondary Teaching	4
INPR 5110	Integrating Teaching Across Contexts	4
INPR 5120	Postsecondary Teaching Practicum	4

### Program Credit/GPA Requirements

12 total semester hours required

Minimum 3.000 GPA required

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